THE MEDICAL JOURNAL OF AUSTRALIA

VOL. I.—32ND YEAR. SYDNEY, SATURDAY, JUNE 2, 1945. No. 22.

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THE MANAGEMENT OF PEPTIC ULCER.[1]

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IN a consideration of the treatment of peptic ulcer it is important that all measures should be based on anatomical and physiological principles correlated with clinical and experimental findings. In this paper I shall endeavour to set out some modern views on the subject as well as some original suggestions, with the reasons for their application.

In the gastro-intestinal tract of all persons there are areas of gastric mucosa which are particularly prone to peptic ulceration. These areas are the lesser curvature of the stomach, the duodenal bulb and the jejunum (anastomotic ulcer). In Meckel's diverticulum also there may be islands of ectopic gastric mucosa which are sometimes the site of ulceration. Why ulceration in these areas should occur in some subjects and not in others is a problem which has engaged the attention of gastro-enterologists for many years. There appears, however, to be little doubt that, in the production of ulcers, particularly duodenal ulcers, both inherited constitutional factors and psychosomatic phenomena play important parts.

The physical factors in gastric ulcer are not entirely the same as in duodenal ulcer. In gastric ulcer the stomach is frequently the sagging type. Hirst suggests that poor posture in patients with this type of stomach tends to cause a kinking, and thus coarse food can traumatize this area. This explains why gastric ulcers commonly appear in one place and tend to recur at the same site. In duodenal ulcer, on the other hand, the subject usually has a hypertonic, rapidly emptying stomach with excess of free hydrochloric acid in the gastric juice. The duodenal bulb is therefore kept constantly filled with acid chyme when the patient is in the erect posture, unless this acid chyme is neutralized by food or other measures.

This high acid concentration plays a major role in the production of ulcers, as will be shown later, although Schwartz's dictum "no acid, no ulcer" is not entirely true, since duodenal ulcers have been found on rare occasions in the absence of free hydrochloric acid in the stomach.

Duodenal ulcers can be said to be associated with hyperacidity as well as with hyperirritability and hyperactivity which involve not only the stomach and duodenum, but the whole personality. Treatment therefore must be aimed at treating the whole individual, not merely the stomach. In fact, some gastro-enterologists believe that psychosomatic factors are paramount in the causation of ulcers. It is doubtful if this is usually true, since severe peptic ulceration has been frequently observed at autopsy in infants as well as in adults of well-integrated personalities with no evidence of psychosomatic abnormalities. However, there is much evidence to suggest that the nervous system plays an important ætiological role, since recurring attacks are commonly associated with increased nervous tension brought about by financial problems, domestic discord, high pressure work and worry *et cetera*, but attacks sometimes occur for no accountable reason and when no breach in life's even tenor has taken place.

The interesting observations of Wolf and Wolff on their laboratory assistant, who had had a permanent gastric fistula since childhood, showed that while depressive feelings, such as sadness, discouragement or self-reproach caused hyposecretion and hypomobility of the gastric mucosa, hostility, resentment and anxiety caused the mucosa to become engorged, with increased acid production and motility. During this phase of engorgement they found that slight trauma, such as stroking the mucosa with a glass rod, would produce small erosions and bleeding points. When the emotional stimuli were of short duration these erosions healed rapidly, but if the nervous tension was maintained the ulcers did not heal. This gives an explanation for the common occurrence of peptic ulceration amongst persons who are in a chronic state of nervous tension of the aggressive type.

Rivers, in demonstrating the effects of nervous tension in the ætiology of ulcers, published the results of a survey of 200 medical men, of whom he found that 20% had peptic

[1] Read at a meeting of the Queensland Branch of the British Medical Association on March 2, 1945.

ulceration, mostly duodenal, and an additional 20% took alkalis periodically for relief of dyspepsia. These findings are particularly significant when contrasted with those obtained in a similar group of Negroes, in none of whom was there evidence of peptic ulceration.

Treatment of the personality is therefore most important. Every attempt must be made to adjust the personal and environmental problems of the sufferers and to persuade them to cease doing rushed work and to take a more placid view of life. They must change their types. When the reason for this necessity is explained, it is often gratifying to observe how successful some patients can be in adopting this changed attitude towards their problems and work. To assist in damping down their nervous awareness regular doses of phenobarbital should be given in the early stages of their treatment, and at other times when nervous tension is preventing adequate mental tranquillity and sleep.

Probably the most important factor in producing duodenal ulceration is the impingement of the acid gastric chyme on the lesser curvature of the stomach and the duodenal bulb. There has been much experimental evidence to confirm this, the best known being the duodenal drainage operations of Mann and Williamson, in which they demonstrated rapid production of ulcers in the susceptible tissues when the alkaline duodenal secretion was shunted away from the stomach. Ulcers have also been produced by feeding animals with high acid concentrates, especially when this was associated with starvation and the administration of histamine. In treatment, therefore, it is necessary to adopt the best means of minimizing the damaging effects of the high acid secretion. It is believed that the chief function of hydrochloric acid is to provide the acid medium required for the digestive action of the proteolytic enzyme pepsin which initiates the digestion of proteins. In the presence of adequate acidity (pH less than 3·5) pepsin digestion will take place on susceptible areas of traumatized gastric mucosa. When the acid secretion is less this action is inhibited. The aim of treatment should therefore be to lessen the production of acid. This can be done by adopting the following measure: (i) controlling all aggressive emotions; (ii) avoiding those foods which are known to stimulate motility and secretion; (iii) taking those foods which have the opposite effect; (iv) neutralizing the acidity to a pH of at least 3·5. There are two chief measures for neutralization: (*a*) direct neutralization of the acid by regular doses of alkali, (*b*) the maintenance in the stomach of a regular supply of acid-buffering foods; these act mainly by the acid-combining power of their proteins.

Alkalis.

Many and varied are the antacids which have been advocated, but care is needed in the selection of the alkali to be used. It has been shown that certain alkalis—for example, sodium bicarbonate, magnesium oxide and magnesium peroxide—after neutralization of the acid present in the stomach go on to stimulate the secretion of more acid; in fact, their stimulus to secretion is almost as powerful as that of histamine. For this reason these compounds should be used only in very limited amounts, if at all. Sodium citrate, on the other hand, although a good neutralizer, does not become alkaline after neutralization. We use it as a routine measure in all milk, prescribing one drachm to each pint of milk (just sufficient not to make the taste objectionable). Not only is it useful as a neutralizer, but it breaks the milk into finer curds.

A report published recently by Gill and Keele, of the Middlesex Hospital, gives the neutralizing value of the most popularly used antacids. They are as follows: two grammes per hour of calcium carbonate raised the pH from 1·75 to 4·35; two grammes per hour of magnesium carbonate raised the pH from 1·9 to 5·1; two grammes per hour of magnesium trisilicate raised the pH from 1·9 to 2·5; two grammes per hour of tribasic calcium phosphate raised the pH from 1·7 to 2·6; two grammes of tribasic magnesium phosphate raised the pH from 1·6 to 3·0; one ounce of colloidal aluminium hydroxide raised the pH from 1·9 to 3·0.

I use almost exclusively either calcium carbonate or colloidal aluminium hydroxide, prescribed as *Mistura Aluminii Hydroxydati* (Australian War Pharmacopœia) without *Aqua Menthæ Piperitæ*, or "Amphojel" (Wyeth). It is difficult to understand why *Aqua Menthæ Piperitæ* has been included in these formulæ, since it has been shown experimentally to increase gastric tonus and motility.

Calcium carbonate when suspended in water is neutral in reaction, but rapidly neutralizes gastric acidity, forming calcium chloride and carbon dioxide. Furthermore, it is extremely cheap and can be used in very large doses without any known ill effects.

Magnesium preparations should not be used as a routine measure, as they act as intestinal irritants with resulting aperient action; but when the patient suffers from constipation an adequate amount of magnesium carbonate should be added.

The tribasic phosphates are also not advocated, as they sometimes irritate the gastric mucosa owing, it is believed, to the formation of phosphoric acid.

Alkalis have no apparent effect on gastric secretion and mobility, and the duration of their effects depends on the degree of acidity and motility of the stomach. When hypermotility is present they are quickly swept out of the stomach into the duodenum, so it becomes apparent that the mere giving of alkalis is of minor therapeutic value unless it is combined with the other measures which reduce secretion and motility.

The time for taking alkalis is important. Frequently doctors prescribe alkali to be taken three times a day after food. The patient, being ignorant of gastric physiology, takes it immediately after food. At this time it is of relatively little value, as the food already taken acts as a neutralizer of the hydrochloric acid present in the stomach at that time. The most effective time is about two hours after food, when the gastric acidity is reaching its peak concentration. It is a good plan to mix the powder with a full glass of water. By this means the full neutralizing effect of the alkali is enhanced by the inhibiting effect of the fluid on gastric motility and secretion. It is thought that, whatever its mechanism may be, this inhibitory effect of the fluid taken with the alkaline powder is the main factor which relieves the pain of ulcer, and not the alkali.

Bismuth.

It is opportune to say a few words here about bismuth, which is still a popularly used drug in hospitals and in private practice. It has been held that it possesses antacid and astringent properties as well as leaving a protective layer over the inflamed areas of the stomach. The truth is that it has so little value in the treatment of gastro-intestinal disorders that, if we were a well-informed profession, its use would have ceased many years ago. It is relatively expensive and as an antacid is of little value. Clark, in 1940, showed that, in order to neutralize the five grammes of pure hydrochloric acid normally secreted by a healthy person in twenty-four hours, no less than 136 grammes (2,000 grains) of bismuth carbonate would be required. This is verified clinically, for it has little value in relieving gastric discomfort. Also, when the subject is viewed in the X-ray screen, the bismuth is found to lie in a pool in the lowest part of the greater curvature and shows no tendency to spread over the mucosa, thus disproving the popular notion that it gives the ulcer surface a protective coating. It has the further disadvantage of blackening the stools and thereby disguising the presence of melena.

Alkalosis.

In the modern treatment of ulcer there is little risk of alkalosis; but it should be remembered that the most severe cases occur in high-grade pyloric stenosis, and it has been known to occur when the patient was taking only calcium carbonate. The treatment is obviously to cease the administration of alkalis and give copious fluids and ammonium chloride until there is a satisfactory fall in the pH of the urine.

Belladonna.

Some physicians advocate the use of belladonna for its antispasmodic effect. Although its action in raising the mean pH of the duodenal contents during fasting affords a rationale for its use, at least during fasting periods, I have not found it to be of any value, nor have I noted any experimental evidence to suggest that it has any place in the treatment of ulcer sufficiently important to compensate

for the distressing dry mouth which many patients experience when the drug is given in doses sufficiently large to exert a therapeutic effect. Furthermore, as belladonna diminishes the secretion of mucus, which is a most important protective agent for the gastric mucosa, I believe that it has no place in the treatment of peptic ulcer.

Foods.

In planning for ulcer therapy it is important to consider the physical and nutritional qualities of foods. Chronic ulceration can be produced experimentally at sites of traumatized gastric mucosa by feeding animals on rough, irritating foods, and these areas heal when they are fed with soft, non-irritating foods. It is important, therefore, that all food should be either soft or capable of being chewed to a soft consistency; it should be non-irritating and non-stimulating and have a good acid-combining power.

Milk.

Milk is the ideal food for ulcer patients. It will neutralize its own volume of 0·3% hydrochloric acid to a pH of 4·0. This is due to the buffering action of its protein and to direct neutralization by its calcium. Patients who do not like milk can often be made to relish it by the addition of cocoa, "Bourn-Vita", ice cream *et cetera*. However good milk may be as a food, it must be supplemented with other foods, for patients soon tire of a wholly milk diet. Moreover, it would require six or seven pints of milk daily to supply adequate caloric requirements, and even a healthy stomach would be made uncomfortable by this amount. Therefore milk must be supplemented by other light foods, the patient being given as much variety as possible in order to prevent his becoming tired of the regimen.

Fats.

It is not sufficiently realized that fats are strong inhibitors of gastric secretion. Their effects are particularly pronounced on the pepsin-secreting cells; they also stimulate the duodenal mechanism, which causes a depression in gastric secretion and motility. The depressing action of fats can be demonstrated by the giving of barium meals with and without fats. When fat is given it is observed that a diminution in mobility, secretion and tonicity occurs. The fat of milk is therefore important, and on account of their higher fat content, cream and butter should be used freely by those who tolerate them well. The effect of olive oil on this mechanism is even more pronounced than that of cream; patients who do not find it disagreeable are advised to take it two or three times daily.

Potato.

In spite of the popular fallacy that potato is indigestible, it is an excellent food for ulcer patients, except for the relatively few people who are allergic to it. The average ulcer diet is deficient in ascorbic acid and thiamin chloride. Potato is rich in these as well as in minerals; further, its caloric value (25 Calories per ounce) is higher than that of milk (19 Calories per ounce). Its vitamin *C* content, which is also greater than that of milk, makes potato especially valuable in the treatment of ulcer, since it has been established experimentally that vitamin *C* exerts an important healing influence on wounds. Furthermore, potato has an alkaline reaction and therefore assists in a mild way as a neutralizer of acid. When mashed with milk, cream or butter it forms a palatable food, which to most patients is a welcome addition to the usual diet of monotonous milk foods. Its advantages in the first-stage diet list are obvious when a comparison is made with the old Sippy type of diet. I advise two or more potato feedings per day, according to the choice of the patient.

Other Foods.

Besides milk, milk foods and potatoes, soft marrow with white sauce, pumpkin and tomato soup (well creamed with milk and cream) also make useful additions to the first-stage menu. Eggs, raw or coddled, are very helpful for the acid-combining power of their protein, also for their fat, lysozyme and slimy consistency. Pawpaw, when mellow-ripe, is usually well tolerated; besides being relished by most patients, it is helpful for its high vitamin *C* content. Most patients like *Zwieback*, but few know how to prepare it properly. Stale white bread should be cut into very thin slices and put into a slow oven until crisp but not browned. It then will break up into fine fragments when chewed.

Sugars.

There is much experimental evidence to show that sugars have an inhibitory effect on motility and secretion. Insufficient advantage is taken of this effect in treatment. Sucking alkaline lozenges provides the combined effects of sugar, alkali and saliva, and I believe this form of therapy will displace the present universally used antacid powders. Not only have such lozenges the above-mentioned advantages, but they are more convenient.

Molasses has for many years had a popular lay reputation for the treatment of gastric disorders. This is not without sound scientific foundation. An average of analyses shows that it contains protein material (3%), minerals (10%), sugars (62%) and moisture (25%). Its relatively high amount of available iron and copper makes it of value in the treatment of the anæmia which is commonly found in peptic ulceration. Not only is its sugar helpful in inhibiting secretion, but, being alkaline in reaction, it is useful for its acid-neutralizing effect. For most people molasses is not palatable, but black treacle spread liberally on bread and butter is often enjoyed.

General Treatment.

From the foregoing it will be seen that there is no reason why a patient should find his menu monotonously uninteresting even in the first stages of his treatment.

In outlining a course of treatment for a patient the following is the procedure which I advocate. The first question to be considered is whether the patient should be treated at home or in hospital. If he has reliable home attention and amenities and will not be disturbed unduly by children or domestic disharmonies, there is no reason why his treatment should not be undertaken successfully at home, providing full written instructions are given regarding diet and care. Most people are not happy in hospital with its environment of sickness and suffering. To others financial considerations are a cause of anxiety, for not only must the hospital expenses be met, but also the visits of the doctor must be paid for. On the other hand, there are those to whom expense is no problem and who, because of inefficient home care or other difficulties, should be treated in hospital. Also for non-cooperative patients a period of strict hospital discipline is invaluable. The doctor must judge which course is better after full discussion with the patient, who should then be told to apply for at least three weeks' leave of absence from his duties. The first week should be spent in bed with bathroom privileges. The second two weeks should, if possible, be spent in a holiday environment where the correct dietetic regimen can be followed. When a patient has an attentive wife or mother, a cottage at the seaside or in the mountains for two weeks usually does far more to rehabilitate him than twice that time spent in hospital or at home. Living at an hotel is usually not satisfactory, owing to the difficulty in obtaining the diet. During this period he should have very light exercise, such as walking or bathing, but should spend at least twelve hours daily in bed rest. The following is the regimen which the patient is expected to follow from the first day:

From 6.30 a.m. to 10.30 p.m. take at two hourly intervals any of the following: milk, junket, "Farex", "Benger's Food" or "Faulding's Food", cornflour, strained porridge, baked or boiled custard, well-boiled rice or sago, egg flip, jellies. Cream should be added freely if well tolerated. Creamed potatoes. Tomato soap well creamed with milk and cream, ice cream (warmed in the mouth and swallowed very slowly). Raw or coddled egg. Stale thinly cut bread without crusts liberally spread with butter and treacle.

A suggested menu for the day would be as follows:

6.30 a.m. (or on waking): citrated milk.
8.30 a.m.: strained porridge or "Farex" *et cetera* and cream (lightly sprinkled with sugar). About one hour later: aluminium hydroxide mixture (half an ounce) and phenobarbital (0·5 grain).

10.30 a.m.: Creamed potatoes and milk or egg flip.
12.30 p.m.: well-boiled rice or sago and cream. About one hour later: aluminium hydroxide mixture (half an ounce).
2.30 p.m.: creamed tomato soup or coddled egg with bread and butter.
4.30 p.m.: creamed potatoes and milk. About one hour later: aluminium hydroxide mixture (half an ounce).
6.30 p.m.: boiled or baked custard or "Benger's Food" with cream. About one hour later: aluminium hydroxide mixture (half an ounce).
8.30 p.m.: malted milk or egg flip. About one hour later: aluminium hydroxide mixture (half an ounce).
10.30 p.m.: egg flip or citrated milk with phenobarbital (0·5 or 1·0 grain).

Another glass of citrated milk should be taken during the night with aluminium hydroxide mixture (half an ounce). Olive oil, if well tolerated, can be taken in doses of one dessertspoonful three or more times a day with meals.

The amount taken depends to some extent on the appetite of the patient, but it is desirable that not less than four ounces at each feeding should be taken on the first two days, and later not less than six ounces. Some patients can take eight ounces or more at each feeding. After the 10.30 a.m. and 2.30 p.m. feedings the patient should be encouraged to sleep. The egg flip mixture consists of eight ounces of milk, one egg and one ounce of cream; it is lightly flavoured with vanilla essence and sweetened to taste. Tea, cocoa or treacle may be added to the milk to alter the flavour. Malted milk, "Ovaltine" or "Bourn-Vita" may be substituted for whole milk.

To prepare citrated milk, half a small teaspoonful of sodium citrate (just sufficient not to make the taste objectionable) should be added to each ten ounces of all the milk used.

Water, if desired, may be taken freely between feedings. It is important that all food should be eaten slowly and chewed to a creamy consistency before being swallowed. All liquids should be sipped. The teeth and mouth should be cleaned two or three times a day. The patient should, as much as possible, be relieved of anxieties and encouraged to relax.

After the first four to seven days of this regimen all symptoms usually disappear. Persistence of pain after this period usually suggests that some complication is present, for example, deep penetration into some other structure, such as the pancreas, or scarring causing pyloric stenosis, or if it is a gastric ulcer one must suspect the possibility of malignancy. With the relief of symptoms the following articles can be added to the list: *Zwieback*, steamed or boiled fish with white sauce, tripe boiled until very soft, invalid mince, chicken, fresh oysters, strained young peas, pumpkin or squash, stewed or baked apple (the skin and core being omitted), stewed ripe peaches or mellow-ripe pawpaw, ripe banana if well tolerated.

After three weeks, if the patient has been maintained symptom-free, a full, bland, low-roughage, non-stimulation diet of cereals, meat, fruit and vegetables can be introduced. There is no need for ulcer patients to be unduly restricted in their diets. They can have ample variety, but they must be made to realize that, for the remainder of their lives they must adhere to certain dietetic principles. These are as follows:

1. Three regular meals per day should be taken, with a glass of creamy milk or egg flip or its equivalent between meals and at bedtime.

2. Thorough mastication is most important, and all foods should be chewed to the consistency of cream. In addition to grinding the food into small particles, thorough mastication is desirable because there is evidence to suggest that saliva plays a much more important part in digestion than is commonly believed. The question of saliva and its importance in peptic ulcer will be the subject of a later communication.

3. There is such great variety of food from which to select that there is no need to lay down hard and fast rules in regard to types of food, as is often done; almost every person has an objection to certain foods, either because they upset him or because he dislikes them. Certain foods, however, must be avoided owing to their rough consistency or stimulating or irritating qualities or indigestibility. Foods to be avoided are: all raw fruit unless mellow-ripe and soft, such as pawpaw and banana, coarse cooked vegetables like stalks of cabbage or hard peas, all raw vegetables (except lettuce), currants, lemon peel, nuts *et cetera*, foods fried in batter, pastry, beef tea and meat soups, sauces, vinegar, chutney, pickles, spices, curry, coffee, alcohol *et cetera*, and very hot or very cold foods unless taken very slowly.

Alcohol stimulates gastric secretion and thus increases the amount of hydrochloric acid to be neutralized. Its use should therefore be forbidden. If it is taken at all it should be in strict moderation only, immediately before or with meals—never between meals.

It is also not sufficiently recognized that coffee or other caffein-containing beverages should be avoided because they stimulate gastric secretion. Coffee and alcohol together manifest a synergistic stimulation of gastric juice. The practice of taking black coffee and brandy or liqueur is therefore particularly harmful.

4. Because they are irritating foreign bodies, all drugs in tablet form should be avoided, and a word of warning should be given against the use of aspirin, which has been shown to have an irritative action on the gastric mucosa; it is not uncommon to find instances of acute exacerbation of symptoms after the taking of a course of aspirin for a cold or rheumatism.

5. Owing to the value of oil in inhibiting secretion and motility, olive oil and cream should be taken freely with meals.

6. No fluid should be taken during meals or until about one hour after. Between meals fluids should be taken freely.

7. As thorough mastication is essential, the teeth must be kept in good order and any gaps fitted with dentures.

8. Unless a high degree of acidity is present, as shown by gastric analyses, there is no need to continue taking alkaline therapy for long after all symptoms have ceased, except for the addition of sodium citrate to the milk taken between meals. This should be continued indefinitely.

Tobacco.

The part played by smoking in the ætiology of peptic ulcer is still the subject of debate, and much experimental evidence and many statistics have been published for and against its importance. Most gastro-enterologists ascribe to it a role of major importance, and some even refuse to treat a patient who will not agree to abstain from smoking. It is doubtful whether smoking in strict moderation is as harmful as some people believe. At the Brisbane Clinic comparisons were made between 150 proved ulcer patients and a control group of non-dyspeptic patients. Of the 150 ulcer patients, 109 smoked two ounces of tobacco per week and 41 were non-smokers. Of the control group, 97 smoked two ounces of tobacco per week and 53 were non-smokers. From these observations it appears that the incidence of ulcer is slightly greater amongst the smokers, but the disparity between the two groups is not great enough to suggest that total abstinence is essential. Smoking in moderation, such as a pipe or cigarette after meals, should do little if any harm. Wolf and Wolff found that smoking a pipe or cigarette was accompanied by no alteration of the pattern of gastric contractions when the smoking was a pleasurable experience.

Focal Infections.

Focal infections are said to play a specific part in some cases in producing ulcers. Although I do not think there is any satisfactory evidence to prove this statement, especially in regard to chronic ulceration, it is wise, on general grounds, to eradicate any septic focus as thoroughly as possible.

Comment.

The principles of treatment are the same in duodenal, gastric and jejunal ulcers; but in gastric ulcer the possibility of malignancy must be constantly borne in mind. Even small, circumscribed, innocent-looking ulcers may be malignant. Symptomatic improvement is not enough

evidence to disprove malignancy, because it is not uncommon for the pain to be relieved temporarily in carcinomatous ulcer by a strict ulcer regimen.

It is therefore important to follow up all gastric ulcer patients and observe physical changes by X-ray examination. Most benign uncomplicated ulcers rapidly heal with rest and treatment. If the size of the ulcer has increased or has not diminished after three weeks of treatment, malignancy must be strongly suspected.

Relapses usually occur within two years of the original attack. If a patient can remain free of symptoms for this period, the prospects of his having little further trouble are good; for this reason it is important to adhere strictly to a full regimen for at least this period. When there is a recurrence it is wise to put the patient on the above-mentioned three-weeks regimen immediately.

Treatment of Complications.

There are now few people who advocate routine surgical treatment for hæmorrhage from an ulcer, because the mortality rate is much higher than that of conservative treatment. The patient should be given complete rest and relaxation and relieved of anxiety. For most subjects morphine or heroin is the ideal drug for this purpose; but it is important to remember that morphine is not well tolerated by a few persons and causes nausea and vomiting, which in some cases are extremely distressing and may have serious or even fatal consequences. It is wise, therefore, before giving the injection, to inquire of the patient whether he has had morphine previously and, if so, whether it was tolerated well. If a patient with no previous experience of morphine vomits after the injection it is wise to assume that it has been caused by morphine. Those patients who are intolerant to morphine are usually equally intolerant to heroin. In such cases codeine or phenobarbital should be substituted. I have seen patients vomiting for days after a gastric hæmorrhage purely because the physician has ordered morphine *pro re nata* in an endeavour to allay this distressing symptom when the morphine was in fact the provocative agent. When hæmorrhage from a stomach ulcer is not associated with obstruction, vomiting seldom occurs, except for the expulsion of copious blood clots.

In the majority of cases the hæmorrhage ceases spontaneously after the fall in blood pressure caused by the sudden blood loss; but it is always wise to have the patient's blood typed in case of continued hæmorrhage. It is important also to distinguish the grave cases early by making a blood count or, when this is not possible, by an estimation of the hæmoglobin value. A red cell count below 2,000,000 per cubic millimetre or a hæmoglobin value of 40% or less indicates the need for a blood transfusion; but it is important not to rely entirely on the blood findings. It is important also to remember that increased pulse rate and fall in the blood pressure are not always constant findings soon after even considerable blood loss. The pulse rate and blood pressure in some cases may not be disturbed while the patient is in the recumbent position, and it is only after he sits up that such signs of hæmorrhage will become manifest. If the patient's condition suggests a severe blood loss, it is well to give a transfusion immediately; the true significance of the blood count findings in relation to blood loss may be delayed for twenty-four to forty-eight hours, as it may take this period of time for the blood volume to be restored by the addition of tissue fluids. Some authorities believe that blood transfusion, by increasing blood volume, may stimulate more hæmorrhage; but if the transfusion is given very slowly it is reasonable to assume that the increase will be too gradual to have such an effect. Five hundred cubic centimetres of blood should be given, and if further bleeding is shown by a fall in the blood pressure, this transfusion should be followed immediately by one or two more. If there is still evidence of further hæmorrhage, prompt operation should be performed together with further blood transfusion. This operation should be the minimum procedure necessary to stop the hæmorrhage. Most of the deaths from hæmorrhaging ulcer occur in persons aged over fifty years; all such patients should therefore be watched carefully for increase in the pulse rate and fall in blood pressure and hæmoglobin value. There appears to be good reason for the time-honoured practice of applying an ice bag to the epigastrium, for it has been shown experimentally to cause reflex vasoconstriction in the serosal coat of the stomach and intestines.

The hæmorrhage having ceased, the next question to consider is the diet. Most gastro-enterologists follow the lead given by Meulengracht, of Copenhagen, who advocated a liberal diet as soon as the patient felt comfortable enough to take it. This appears logical for the following reasons: (i) peristalsis is more active in the empty, hungry stomach; (ii) food and fluids inhibit motility and secretion; (iii) food in the stomach does not appear to increase or protract the bleeding; (iv) post-hæmorrhage shock is diminished; (v) when the body is nourished, healing and blood regeneration are helped; (vi) there is less loss of strength and convalescence is shortened; (vii) statistics supply therapeutic proof of Meulengracht's contentions, the mortality rate having been reduced from 7% to 10% to 1% to 3%.

It is our practice to encourage patients to sip citrated water and milk sweetened to taste with glucose as soon and as often as they desire during the first twenty-four hours. The glucose solution must not be strong, as it is then often nauseating. During this period few feel inclined for food. As soon as they do so they are allowed to follow the regular regimen. In this stage food must not be forced and patients should be permitted to follow their own inclinations to a large extent. Iron should be given with caution, as it is not well tolerated by some patients. *Ferri et Ammonii Citras*, if given in a glass of milk, rarely causes discomfort, and it is more readily absorbable when mixed with milk. If it causes discomfort I substitute the enteric-coated "Emplet Ferrous Sulphate" (Parke, Davis and Company), for although it is desirable to give no drugs in tablet form, the need for iron is urgent and the smooth enteric-coated tablet soon passes out of the stomach. Under this regimen it is remarkable how quickly a patient will recover to normality even after a severe hæmorrhage.

A complication of duodenal ulcer, which used always to be considered an indication for surgery, is pyloric stenosis. The onset is insidious, often with little pain; usually only a sense of fullness is experienced, which is relieved by vomiting once or twice a day or less frequently, usually at night. It is remarkable how patients with dilated stomachs and a large food residue will usually respond to rest, diet and aspiration of the stomach contents at bedtime. The patient soon learns to pass the tube, and the character and quality of the food residue can be observed to improve day by day. Aspiration is continued for ten to fourteen days, till the residual amount is only about 30 to 50 cubic centimetres, depending, of course, on the quantity of food given and the time before the wash-out. During this treatment only liquid or soft creamy foods should be taken. After the stomach has been aspirated each night, two raw eggs beaten in a glass of citrated milk and one grain of phenobarbital should be taken either through the tube or by mouth. In a few cases, in spite of this treatment, X-ray examination reveals little reduction in the stenosis. This is due to repeated attacks of ulceration causing permanent circular scarring of the duodenum. Occasionally chronic obstruction results from inflammation and œdema in a prepyloric ulcer. These persistent cases, which are relatively few, should be handed over to the surgeon.

Except for acute perforation, the only other complications which should need surgical treatment are penetrating ulcers, which, in spite of careful treatment, continue to cause pain, or gastric ulcers, which either because their symptoms persist or because X-ray examination reveals no lessening in size, suggest the possibility of malignancy.

Some physicians consider that continuous drip therapy is the best method of treating ulcers, because it supplies continuously a neutralizer of the gastric acids. It is a distressing procedure, which in my opinion is not indicated, because such excellent results are obtained by the simple procedures already outlined. It may be worth a trial in penetrating ulcers before surgical treatment is advocated.

Chemotherapy and Röntgen therapy have been advocated; but I have had no experience of their use in ulcer cases,

nor have I seen any published evidence to indicate the need for a change in the foregoing routine.

Conclusion.

In conclusion I believe that the most important need in the treatment of peptic ulcer is a full explanation to the patient of the physical and psychological factors which are understood to bring the ulcer into being. In order that he will be induced to take adequate care of his stomach, he must be taught the dictum "once an ulcer always a potential ulcer"; but he should be told that, with proper care, the ulcer should rarely become an invaliding or incapacitating condition. If it is a duodenal ulcer, he should be told that such ulcers never become malignant, so that he will be relieved of the anxiety which all ulcer patients experience regarding the possibility of cancer. If it is a gastric ulcer he should be advised to report for reexamination if there is any recurrence of his symptoms, however mild. He should be encouraged to change his type and mode of life, so that while still taking his full place in society he will have regular hours of work, ample time for meals and periods of rest. He should be shown the necessity to develop a placid, tolerant disposition, since aggressive thoughts, especially of resentment and hostility, cause gastric hypersecretion and hypermotility and therefore increase the risk of recurrences. Finally, perhaps the most important rules to be observed are to take three regular full meals a day with a glass of milk or its equivalent between meals and at bedtime, to chew all food to the consistency of cream so that it is well mixed with saliva, and always to be the last to leave the dining table.

URINARY COLIC DUE TO CRYSTALLURIA AND CALCULI IN HOT HUMID CLIMATES.

By THOMAS F. ROSE,
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IN tropical areas urinary colic is common in troops recently arrived from temperate zones. Among 1,020 general surgical admissions to an advanced field hospital, excluding those for wounds or accidental injuries, 62 patients (6%) were suffering from renal or ureteric colic due to crystalluria or calculi. (This series does not include patients suffering from the renal complications of sulphonamide therapy.) Sixty-one of the 62 patients came from temperate zones and had never had urinary symptoms prior to their arrival in the tropics. The one patient who had had previous renal symptoms had lived for two years in a hot, dry area of Australia, where the drinking water was highly mineralized bore water. In two years a phosphatic calculus formed in the left kidney and was removed by pyelolithotomy. He then lived for five years in a cooler southern climate, and later came to the tropics. A year later he had his first attack of renal colic since the operation. This was caused by further calculi in the same kidney. These had probably formed only since his arrival in the tropics, as it is known that phosphatic calculi can form rapidly in an already damaged kidney, as shown by Pena,[1] who published a report of a case in which a large staghorn calculus was observed to form in 38 days.

Classification of Patients.

The urinary colic was due to free precipitated crystals, usually calcium oxalate or triple phosphate, in the urine, or aggregations of these crystals to form calculus-like masses or true calculi. In many instances a combination of these causes was present.

By clinical means alone it was impossible to state which of these factors was the cause of the colic, as urinary colic due to crystalluria may be even more violent than that due to a formed calculus. Analysis of the urine gave information as to the type of crystals, but again could not differentiate the cause of the colic. However, by repeated clinical observations and excretion pyelographic examinations, these patients were able to be divided into four classes, as follows: class A, containing 38 patients with normal urinary tracts; class B, containing five patients with radio-translucent ureteric aggregations of crystals; class C, containing ten patients with radio-opaque ureteric aggregations of crystals; class D, containing nine patients with true renal or ureteric calculi.

Stages of Calculus Formation.

These four classes may be correlated by a consideration of the formation of urinary calculi in hot, humid areas, where the drinking water does not contain an undue percentage of minerals. This occurs in the following stages.

For the first few weeks newcomers to the tropics from temperate zones sweat continuously. They compensate for this fluid loss by drinking as much fluid as possible, so keeping the urine at its normal dilution. Consequently, in this period there is no tendency to crystalluria or calculus formation. It may be noted that this stage is absent in hot, dry areas, where drinking water is scarce and highly mineralized. Newcomers to such areas immediately suffer from painful micturition due to the high mineral content of the urine.

The second stage, occurring in from one to three months, is that of crystalluria. Here the body adjusts itself to the new conditions, and though he is still sweating, the patient drinks much less water. Consequently the urine becomes highly concentrated. This upsets the colloid-crystalloid mechanism of the urine whereby such water-insoluble substances as calcium oxalate or uric acid are kept in solution. Water-soluble substances such as phosphates become supersaturated and are also deposited. Thus calcium oxalate or uric acid crystals are precipitated in constantly acid urine, or amorphous and triple phosphate and ammonium urate crystals in a constantly alkaline urine. The crystals are first precipitated in the collecting tubules and pelvicalyceal system of the kidneys. They then enter the ureter and irritate the mucosa, so causing colic. At first the crystalluria is intermittent, so that between attacks of colic no crystals are found, whereas the urine passed during an attack of colic will be loaded with crystals. Later, crystals appear in the urine at all times.

The third stage occurs during the next six months. The crystals aggregate loosely together to form radio-translucent masses, which are too small and loosely bound together to throw a shadow on the radiograph. They may even become bound together by a matrix of foreign protein derived from blood cells from the traumatized urinary tract mucosa. Should they lodge in the ureter, more and more crystals precipitate above them, and the mass tends to elongate up the ureter.

Though these masses may cause the same symptoms and complications as true calculi, nevertheless they are not true calculi, because their constituents retain their crystalline form. Dilution of the urine, or a change in its reaction, will cause these aggregations to disintegrate into their separate crystals, which can still redissolve in the urine. A true calculus, however, is not a crystalline body.[2] It is formed of a protein matrix and amorphous salts derived in some manner from crystals such as calcium oxalate or triple phosphate. The constituents of this body cannot be changed back to their crystalline form. It will not disintegrate on dilution of the urine or on a change in its reaction. It can be broken up only by being crushed, and the resultant fragments are still pieces of calculus and cannot redissolve in the urine. Consequently it is incorrect to speak of radio-translucent calculi in this stage. They are radio-translucent aggregations of crystals.

The fourth stage of calculus formation, commencing about nine months after the subject's arrival in the tropics, sees the masses of crystals become more closely packed together into a calculus-like body whose calcium content is now sufficient to throw a shadow on the radiograph. Nevertheless, though it may descend as an entity down the ureter, it can still be disintegrated and dissolved by a dilution of the urine or by a changed reaction of the urine. The mass disintegrates either in the ureter or in the bladder, and never reaches the exterior as a formed mass.

At any period in the above stages may occur the unknown change whereby the crystals become irrevocably changed

into the amorphous substance of true calculi. These are formed in the kidney and may become lodged in the calyces or pelvis, forming renal calculi. They do not disintegrate on reaching the bladder, where they may stay as bladder calculi, or they may be small enough to pass to the exterior through the urethra. They may become impacted anywhere in the urinary tract, causing obstructive phenomena and finally diminished renal function. A true calculus cannot be distinguished from a radio-opaque aggregation of crystals by a study of a single X-ray film alone. This distinction can be made only by serial pictures, when the crystalline mass may be observed to disappear, or by examination of the calculus when it is passed or obtained by operative means.

In none of this series of 62 patients did inflammation play any part in the precipitation of crystals or in the formation of the calculi. Bacilluria was absent in all cases. Pus cells were found in the urine of 14 patients, but in only four cases was the amount above normal, and in these attempted culture yielded no growth. This is in agreement with Handfield-Jones and Porritt,[4] who state that infection is not a necessary factor in stone formation in the urinary tract.

Avitaminosis played no part, because all patients had been receiving the normal army diet, which fulfils all necessary vitamin requirements.

There was no clinical evidence that any of these patients suffered from hyperparathyreoidism, though it is well known that the formation of renal calculi may long precede bone changes and elevated blood calcium levels.[3]

Description of Cases.

The 38 patients of class A, whose urinary tracts were found to be normal by excretion pyelography, belong to the stage of crystalluria. No crystals were found in the urine of 14 patients examined a few hours after the attack of colic; the urine of 12 was constantly acid, and that of two was alkaline, though red blood cells were found in three instances. Specimens of urine were able to be obtained from three of these patients during a subsequent attack of colic, and were found to contain calcium oxalate crystals. These patients had been for an average of four weeks in the tropics, and this was their first attack of colic. The remaining 24 patients of class A had constant crystalluria; 15 passed calcium oxalate crystals in constantly acid urine, eight passed triple phosphates and one urates in alkaline urine. Six of these patients had red cells in the urine. They had been longer in the tropics, their stay averaging three months, and eight of them had had two to four attacks of colic in the month prior to their admission to hospital.

The five patients of class B belong to the third stage, during which the crystals form into radio-translucent masses. They had been for three to eight months in the tropics, the duration of symptoms averaging six weeks. Four passed consistently alkaline urine containing triple phosphates, one passed acid urine containing calcium oxalates, and one passed acid urine containing uric acid crystals. Two had hæmaturia, macroscopically apparent in one case, microscopically apparent in the other. Four of these patients had one mass only, and in each case the excretion pyelogram was characteristic and diagnostic. Thus normally functioning kidneys were seen, the affected ureter being constantly dilated for a variable distance above a constantly present filling defect, which was causing partial obstruction to the flow of dye. The level of obstruction varied in different patients from the third lumbar vertebra to the ischial spine. In each instance the urinary obstruction was incomplete, and the dye flowed past it into a ureter of normal calibre. In no instance was hydronephrosis seen. When the reaction of the urine was changed these aggregations were observed by serial pyelographic examinations to disappear in from one to four weeks. In two instances the masses descended a little before disintegrating, but in no instance did they reach the bladder. On their disappearance the ureters resumed their normal appearance.

The fifth patient of class B had a radio-translucent mass of calcium oxalate crystals impacted in each uretero-vesical junction, causing anuria lasting for thirty-six hours.

The ten patients of class C belong to the fourth stage, during which the crystals become aggregated firmly enough to appear as a radio-opaque shadow on the X-ray film. These patients had been in the tropics from nine to eighteen months, and the histories of urinary disorder varied in length from two weeks to six months. In eight cases the urine was acid and contained calcium oxalate crystals, and in two cases it was alkaline and contained triple phosphate crystals. Four patients had hæmaturia. Initial radiographs showed the masses to be at any level from the second lumbar vertebra to the uretero-vesical junction. Excretion pyelography showed normally functioning kidneys on the affected side in each instance. In one case a hydroureter was present, and in two cases a hydroureter and hydronephrosis were found, but in no case was obstruction complete. All these calculus-like masses were observed to descend the ureter, taking from one to five weeks, into the bladder, where they disintegrated into their component crystals, none being passed as solid bodies. Once this occurred, the dilated ureters and kidneys rapidly assumed normal shape and size.

All the patients of class D had true urinary calculi. They had been in the tropics from nine months to two years, and the history of urinary disorder extended over an average of six months.

Three of these patients had renal calculi, one had renal and ureteric calculi, four had a unilateral ureteric calculus and one had a unilateral ureteric calculus and a radio-translucent mass of crystals in the opposite ureter.

Each of the three patients with renal calculi had involvement of one kidney only. In two cases the urine was alkaline and contained triple phosphates, and in the third case it was acid and contained calcium oxalate crystals. Macroscopically apparent hæmaturia was present in all three cases. Excretion pyelography showed that two patients had a single calculus in a major calyx of a normally shaped and functioning kidney. The third, the patient previously mentioned, who had recurrent renal calculi, had three large calculi in the pelvis and lower major calyx in a hydronephrotic kidney, which nevertheless had good function.

One patient of class D had a non-functioning kidney in which were two calculi. The cause of the loss of function was a calculus impacted in the ureter at the level of the third lumbar vertebra, causing complete obstruction. This patient had been for two years in the tropics and had suffered from renal colic for eighteen months. These calculi were later shown to be phosphatic.

Four patients of class D had a unilateral ureteric calculus. The urine of each was acid and contained calcium oxalate crystals and red blood cells. The calculi were situated from the level of the third lumbar vertebra to the ischial spine, and took from two to six weeks to pass to the exterior, when they were all found to be composed of calcium oxalate. Excretion pyelography showed that all four patients had normal renal function. In two cases hydroureter and hydronephrosis were caused, but in no case was obstruction complete. The pelvicalyceal system assumed a normal shape as soon as the calculus passed out of the ureter. One calculus was observed to descend nearly the whole length of the ureter without causing pain, so that length of history does not necessarily coincide with the age of the calculus. One patient had passed three oxalate calculi in the two months prior to his admission to hospital, though he had only one when examined.

The last patient of class D had a unilateral calcium oxalate calculus impacted at the lower end of the left ureter, followed later by impaction of a radio-translucent mass of oxalate crystals at the lower end of the right ureter. This caused anuria lasting twenty-four hours.

Complications.

There were nine patients who had temporary hydroureter or hydronephrosis, which disappeared as soon as the obstruction was overcome. The patient who had recurrent renal calculi had a large hydronephrotic though still functioning kidney. In the case of combined renal and ureteric calculi, the affected kidney was non-functioning.

Two patients suffered from anuria due to bilateral ureteric blockage.

The first patient had one month's history of left-sided renal colic; he passed acid urine containing calcium oxalate crystals and red blood cells. He then had a sudden attack of right ureteric colic, after which he passed some blood but no urine. He was seen twenty-four hours later and observed to have severe pain in both loins. His kidneys were tender and appeared to be enlarged. No urine was present in the bladder. A plain X-ray film revealed a small, opaque shadow lying in the line of the lower end of the left ureter. Both renal shadows were greatly enlarged. Excretion pyelography was performed, but the kidneys could excrete only sufficient dye to make the renal shadows more prominent, none reaching the pelvicalyceal system. Fluid, including sodium-bicarbonate-sodium-lactate solution, was administered intravenously, and three hours later he commenced to pass dilute urine which, while neutral in reaction, still contained some calcium oxalate crystals. The loin pain and renal tenderness and enlargement now gradually subsided. Excretion pyelography the next day showed both kidneys to be of normal shape and function, the dye entering the bladder through both ureters. The opaque shadow in the left ureter was still present, and later cystoscopic manipulation was required to remove an oxalate calculus.

The second patient had one week's history of right renal colic due to calcium oxalate crystalluria. He then had a sudden persistent pain in his left groin, followed by the frequent passage of blood but no urine. On examination twenty-four hours after the anuria commenced, he was vomiting and had severe pain in both loins. His kidneys were tender and enlarged. There was no urine in the bladder. A plain X-ray film of the urinary tracts revealed only great enlargement of the renal shadows. Excretion pyelography showed that the kidneys were excreting no dye at all, as not even the shadows became accentuated. As he was vomiting, saline solution was administered intravenously, together with the sodium-bicarbonate-sodium-lactate solution, to change the reaction of his urine. (Sodium sulphate solution for intravenous administration was not procurable.) This therapy was effective, and six hours later the patient suddenly commenced to pass enormous quantities of dilute urine loaded with oxalate crystals. Excretion pyelography some days later showed both kidneys to be of normal shape and function, with no obstruction in the urinary tracts.

When the above cases are considered, anuria in the tropics affecting patients with crystalluria is seen to be due to bilateral aggregations of crystals which block both ureters. There may be a preceding calculus, as in the first case, which further helps the crystals in their obstructive efforts. The anuria is at first only apparent because, though no urine reaches the bladder, both kidneys are still excreting urine; this is shown by their increase in size, which causes loin pain and tenderness. The kidneys excrete more and more dilute urine, though its reaction is unchanged. Only a little dye is excreted, and later none at all. The crystals are still being laid down, so that the masses grow up the ureters. At first, urinary tract peristalsis, by which urine is carried from kidney to bladder, is still active, and if the urinary reaction is changed by intravenous medication, this urine is able to be mixed with the crystals and so gradually dislodge and dissolve them. Thus the way to the bladder is opened, and enormous amounts of dilute urine are passed. As early as five minutes after the obstruction is overcome, the excretion pyelogram may reveal normally shaped and functioning kidneys, with no hint of urinary dilatation.[3] This is the clinical picture as seen in both these cases.

If the condition persists further, cystoscopy will show that pelviureteric peristalsis ceases, owing to the increasing distension of the urinary tract caused by the kidneys, which still continue to excrete dilute urine. This is accompanied clinically by severe persistent lumbar pain and renal tenderness and swelling. Now, however, the urine is stagnant, contained in an immobile, paralysed urinary tract, and it cannot be brought into contact with the obstructing crystals even though its reaction may be changed by intravenous medication. Urinary peristalsis may still be stimulated by distension of the bladder, as for a cystoscopic examination, or by catheterization, or even only by an attempt to catheterize the ureters. High spinal anæsthesia may also stimulate ureteric peristalsis. Then the urine can be carried down to dissolve the crystals.

If the ureters can be catheterized, the washing out of the pelvicalyceal system with alkaline solutions further overcomes the obstruction. Should the urinary tract be so distended that no stimulus can excite peristalsis, bilateral pyelotomy must be performed. When the pelves are opened, a gush of dilute urine reveals the tension under which the kidneys have been working. This relief of pressure immediately allows peristalsis to recommence, and with the aid of wash-outs from above the ureteric obstruction is overcome.

During all this time the kidneys are still able to excrete urine, even if it is very dilute, so that the anuria is apparent only and not real. Once the kidney stops excreting urine, then true anuria occurs, and one can do nothing to obviate death.

Treatment of Crystalluria and Calculi in the Tropics.

In order to prevent crystalluria or calculus formation in hot areas, the fluid intake of all persons must be adequate. Patients with recurrent crystalluria or calculi should live in more temperate zones.

The treatment of established crystalluria employed in this series, whether the crystals were aggregated into masses or not, was the same in all cases. As much fluid as possible was given to dilute the urine. When the crystals were of calcium oxalate in acid urine, potassium citrate was administered to render the urine alkaline, so that the crystals would be dissolved or the masses disintegrated. If alkaline urine containing triple phosphate crystals was present, then acid sodium phosphate was given to render the urine acid. Pain was treated by the intravenous administration of morphine, which acted efficiently and quickly.

The patients who had true ureteric calculi were treated in the same way, so that crystals would not be precipitated and so aid the calculus in further obstructing the ureter or blocking the other kidney to cause anuria. All the calculi descended of their own accord. "Prostigmin" was used in a few instances to see if it would hasten the descent, but it appeared to have no effect. Any obstructive effect was carefully observed by excretion pyelography, and the urine was frequently examined for evidence of the onset of infection.

The renal calculi required operative removal.

"Solution G" was not used in any appropriate case, as in most instances no cystoscope was available.

Prognosis.

Few of these patients were able to be followed up for any length of time, but it may be stated that for those suffering from crystalluria only the prognosis is good, provided that they maintain an adequate fluid intake so that crystals will no longer be precipitated. If, in spite of this, attacks constantly recur or actual calculi form, then there is always a serious risk of further formation of stones whilst the patient remains in the tropics.

Excretion Pyelography.

Excretion pyelography was a most valuable means of investigation, as by its use the cause of the colic could be established and the continued effect on the kidney structure and function could be observed. It was especially helpful in localizing shadows of doubtful import by observation of their relationship to the column of dye, anteroposterior, oblique and lateral films being used when necessary.

Serial pyelograms enabled the fate of any mass or calculus to be determined, its disintegration or passage into the bladder being reported.

Excretion pyelograms afforded little help in the cases of anuria, so little dye was excreted by the unobstructed kidneys. It was only after the obstruction was relieved that the structure and function of the kidneys were able to be observed. If pyelography was performed soon after an actual attack of colic, whether due to crystalluria or to calculus, in many instances the kidney of the affected side did not excrete the dye at all, nor did it do so for at least another twelve hours. Consequently, excretion pyelography was not performed until twelve to twenty-four hours after an attack of colic.

No ill effects of excretion pyelography were noticed, save for a few cases of pain due to venospasm of the cephalic or basilic veins.

Summary.

Sixty-two cases of urinary colic among patients in the tropics are presented.

The patients were divided into four classes. Class A contained 38 patients with normal urinary tracts. Class B contained five patients with a radio-translucent ureteric aggregation of crystals. Class C contained ten patients with a radio-opaque ureteric aggregation of crystals. Class D contained nine patients with true renal or ureteric calculi.

These classes are correlated by a consideration of the stages in the formation of calculi in hot, humid climates.

Complications, including anuria, are considered.

A brief outline is given of prevention and treatment of crystalluria and urinary calculi.

The value of excretion pyelography is stressed.

Acknowledgement.

I wish to thank the Director-General of Medical Services, Australian Military Forces, Major-General S. R. Burston, for permission to publish this paper.

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Reports of Cases.

A CLINICO-PATHOLOGICAL STUDY OF FIVE CASES OF EPENDYMOMA.

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IN a series of 1,106 intracranial gliomata collected from the literature, Kinnier Wilson(1) found that only 60, or 5·4%, were ependymomata. Nevertheless, despite their low incidence, these tumours are of importance because many of them are relatively non-malignant and frequently offer excellent opportunities for removal.

On histological grounds Kernohan, Woltman and Adson(2) and Kernohan(3) divided the ependymomata into epithelial, myxopapillary and cellular types. Kernohan and Fletcher-Kernohan(4) later included a fourth variety—namely, papilloma of the chorioid plexus. To these should perhaps be added a fifth subdivision, comprising examples of the tumour known as *spongioblastoma ependymale* (Bailey,(5) Globus and Kuhlenbeck(6) and Swan(7)).

The present paper deals with the clinico-pathological findings and results of treatment in five cases of ependymoma which have occurred in South Australia.

Clinical Records.

CASE I.—J.F., a girl, aged four years, was first examined in consultation by Dr. L. C. E. Lindon on December 15, 1932. For seven months she had suffered from morning headache and vomiting. She had also lost weight. On examination, the child was pale. Her neck was slightly extended and her occiput was held over to the right. Her gait was staggering. Macewen's "cracked pot" sign was elicited. Pronounced lateral nystagmus was present when she looked to either side. Mild bilateral papillœdema, more apparent in the left eye, was detectable.

At the Memorial Hospital, after a few days' rest in bed together with dehydration treatment, the child's headache, vomiting and acetonuria disappeared. X-ray examination of her skull disclosed evidence of increased intracranial tension. There appeared to be bulging of the right sub-occipital region on both physical and X-ray examination. Questionable wasting and hypotonia of the right leg were observed. The left arm tended to deviate.

Dr. Lindon performed suboccipital craniotomy in two stages on December 20, 1932, and January 11, 1933, respectively. The lateral ventricles were dilated and contained cerebro-spinal fluid under much increased pressure. A hard, nodular, greyish-brown tumour was found between the lower end of the cerebellar vermis and the *medulla oblongata*; it appeared to arise from the dorsal aspect of the latter. The tumour did not infiltrate the lobes of the cerebellum, but sent lateral prolongations forwards to embrace the *medulla oblongata* and a process downwards into the spinal canal. The spinal prolongation and as much as possible of the lateral processes were removed, but some of the tumour in relation to the dorsal surface of the *medulla oblongata* could not be excised.

On her discharge from hospital on February 9, 1933, the child had asynergia of the ocular muscles and nystagmus of the right eye. She was still ataxic and held her head in a position indicative of a right cerebellar lesion. She enjoyed good health until October, 1933, when she contracted a cold, associated with headache, vomiting and a staggering gait. These signs and symptoms disappeared completely when she recovered from her respiratory infection. From then on her health was excellent until August, 1934, when she caught a severe cold associated with symptomatology similar to that of October, 1933.

On her admission to the Adelaide Children's Hospital on September 1, 1934, the patient had a typical cerebellar gait. She held her head forwards and a little to the right. The nystagmus together with the loss of muscle balance of the right eye, which had been noted previously, were still present. Papillœdema was absent. Pronounced bulging and pulsation of the wound in the suboccipital region were noted. Further exploration, carried out by Dr. Lindon on September 10, 1934, disclosed recurrence of the tumour. It was similar in appearance and extent to that revealed at the original operation in 1932-1933. A large portion of the tumour, measuring six by three centimetres, was removed, but total excision could not be effected owing to the poor condition of the patient.

From September 24 to October 25, 1934, the child was treated at the Royal Adelaide Hospital by deep X-ray therapy. She was discharged from the Adelaide Children's Hospital on November 4, 1934. On her return home, apart from ataxia, she was active and enjoyed reasonably good health, so much so that at Easter, 1936, she was able to go to school. However, she still caught a considerable number of colds. Her husky breathing was suggestive of bronchial obstruction, and she tended to snore and snort. The patient went to bed in her usual state of health on October 11, 1936, and died in her sleep.

CASE II.—R.W., aged eleven years and two months, a schoolboy, was admitted to the Adelaide Children's Hospital on November 15, 1936. Apart from minor attacks of vomiting he had been quite well until six weeks before, when he had become drowsy, especially in the morning, had started to vomit and had lost his appetite. Vomiting bore no relationship to meals and was without preliminary nausea.

The patient was thin and pale. He complained of severe frontal headache. His pulse rate was 52 per minute. Pronounced papillœdema and intense congestion of the retinal veins were present, but there was no great contraction of the visual fields. Lumbar puncture showed the pressure of the cerebro-spinal fluid to be 85 millimetres of water; the fluid contained 710 milligrammes per 100 cubic centimetres of chlorides, the globulin content was not increased and sugar was present.

On November 18, 1936, the only localizing signs detectable were dimunition in activity of the left knee jerk and of the left plantar reflex. Pain in the right orbital region was present, and the patient had become increasingly drowsy. Dr. L. C. E. Lindon performed suboccipital craniotomy. Preliminary ventricular puncture revealed internal hydrocephalus. A reddish-brown, but not excessively vascular, tumour occupied the *cisterna magna*. It was attached, over an area of 0·5 centimetre in diameter, to the floor of the fourth ventricle in the region of the left *trigonum hypoglossi*. Otherwise it did not invade the brain tissue, was entirely encapsulated, and had displaced the cerebellum upwards. Except for a thin layer at its origin the tumour was removed

[1] Working with the aid of a grant from the National Health and Medical Research Council of Australia.

in its entirety. The child made a rapid recovery and was discharged from hospital on December 23, 1936.

On his readmission to the Adelaide Children's Hospital on February 25, 1937, the patient complained that since the operation three months earlier he had been unable to raise his head and look upwards on account of giddiness. For a fortnight he had had frequent attacks of hiccup and of dizziness and had been slow in his movements. For four days he had suffered from morning nausea and vomiting. On examination, no abnormality was detected. Lumbar puncture showed the pressure of the cerebro-spinal fluid to be 105 millimetres of water.

On March 4, 1937, the child was transferred to the Royal Adelaide Hospital. In addition to the symptoms mentioned above he complained of diplopia. The only abnormality revealed on examination was nystagmus. From March 8 to March 25, 1937, deep X-ray therapy was given. By the latter date the patient had gradually become more drowsy and had lost his appetite. He had not vomited, but had had occipital headache after each treatment. On March 26 the wound in the suboccipital region was bulging and bilateral papillœdema was present. In the hope that these symptoms and signs might have been due to a reaction to the Röntgen radiation, operation was deferred until April 7, 1937. Dr. Lindon then removed a tumour the size of a hen's egg from the cerebellum. On the following day the patient had two epileptiform seizures which involved the left side of the body. Later he exhibited difficulty in swallowing and laboured breathing. His temperature rose to 105·8° F. Death occurred from respiratory failure that night (April 8, 1937).

CASE II!.—E.B., a married woman, aged twenty-four years, was admitted to the Royal Adelaide Hospital on September 7, 1938. For about fifteen months she had suffered from occipital headaches and drowsiness, especially in the morning. Over a period of eleven months her sight had gradually deteriorated. Occasionally she had noticed numbness of the left side of her face. Several months prior to her admission to hospital she used to vomit for three or four mornings and then be free from vomiting for about a week.

On examination of the patient, her pupils were large, but reacted to light and accommodation. Severe bilateral papillœdema was present. Examination of her visual fields revealed left homonymous hemianopsia. Nystagmus was present, more pronounced when the patient looked to the right. The tendon reflexes in the left arm were more apparent than those in the right. On walking, her right arm swung less than her left. Dr. L. C. E. Lindon considered that her gait was suggestive of a cerebellar lesion. X-ray examination of the skull gave the impression of bony destruction in the region of the *sella turcica* and of opening of the cranial sutures as the result of increased intracranial tension.

On September 16, a ventriculogram revealed enlargement of both lateral ventricles; they were displaced towards the left side anteriorly. These appearances were thought suggestive of a tumour of the anterior part of the right cerebral hemisphere. On the following day an exploratory craniotomy was carried out by Dr. Lindon through a right frontal osteoplastic flap. A small cystic swelling was seen at the anterior end of the floor of the third ventricle; the swelling was thought to overlie an inoperable tumour of the ventricle. The operation was therefore concluded without further interference. By September 20 the patient was able to speak rationally, but she had a left-sided facial paralysis. On September 21 the patient had a "spasm", which commenced in her throat and involved the left side of her face. Her eyes and mouth also twitched. She died suddenly that night.

Autopsy was carried out on September 22, 1938. In the right frontal lobe recent hæmorrhages and necrotic areas were found. There was an opening into the right lateral ventricle, and hæmorrhage from the chorioid plexus into the ventricle had occurred. In the cerebellum there was a tumour the size of a golf ball; examination of cross sections showed it to be red and grey.

CASE IV.—A.R., a schoolboy, aged seven years and four months, was admitted to the Adelaide Children's Hospital on September 27, 1939. For ten months he had suffered from constant headache and from vomiting, especially in the morning. He had lost weight, was always tired and used to fall asleep easily. His legs had become weak. Two years before he had been hit on the head by a cricket ball.

Examination disclosed gross bilateral papillœdema, more pronounced in the left eye. X-ray examination of the skull showed widening of the fronto-parietal sutures, indicative of increased intracranial pressure.

On October 2 the cerebro-spinal fluid was under a pressure of 230 millimetres of water. There was a slight increase of globulin; 720 milligrammes per 100 cubic centimetres of chlorides were present.

Suboccipital craniotomy was performed by Dr. L. C. E. Lindon on October 12, 1939. A large, soft tumour was found between the lobes of the cerebellum passing down into the *foramen magnum*. Except for its origin from the lining of the fourth ventricle, all of the tumour was excised. Some time after operation an arachnoid cyst developed. On some occasions it contained from 100 to 200 cubic centimetres of fluid. It was treated by repeated aspiration. A slight convergent squint, considered to be due to paresis of the left abducent nerve, was noted about a month after the operation. The child was discharged from hospital on March 28, 1940. When he was tested in June, 1942, visual acuity in each eye was %.

For the following progress report (dated September 8, 1944) I am indebted to Miss Mary Smith, of the Education Department:

> (the patient) . . . was first referred to me by the Headmaster of Hindmarsh School late in August, 1943. It was felt that owing to his physical disabilities he needed special attention for remedial teaching. His mental age on a Binet scale was at that time 8 years and 8 months and his intelligence quotient 77. Memory for verbal material presented orally did not go beyond an 8 year level and comprehension was at the same stage. As his schooling had been interrupted, vocabulary tests did not show a high standard.
>
> He was admitted to the Opportunity Class at Hindmarsh on March 1, 1944. His teacher reported that although he was very quiet and timid he showed a certain antagonism to individual teaching at first. He has overcome this emotional disability and has now no hesitation in asking for whatever he requires by way of material or information. He is very anxious to learn and is thoughtful and unselfish in his attitude to his companions. He plays games and plays them well, with boys of his own age, and has shown a decided flair for drawing and gardening.
>
> His progress in school work has been good. In March, 1943, he was starting Grade I work in reading and spelling and Grade III work in arithmetic. Now, although he is not particularly interested in reading, he has almost completed Grade III and has made commensurate progress in spelling. In arithmetic he has nearly half-finished Grade IV work, and we hope that by the end of the first term in 1945 he will have reached a Grade V standard in these subjects.
>
> His general health has been satisfactory since he has been in the class. He does not complain of any defect in vision and has missed only one day since his admission. His absence was due to a bad headache. The back of his neck is extremely sensitive and he is terrified of it being touched. His teacher on one occasion put her arm across his shoulders in a gesture of approval and accidentally touched his neck. He cried bitterly, but there has been no trouble whatsoever in the yard or in games. This, as far as I can ascertain, is the only time on which he has been upset at school.
>
> Social reports indicate that he is clean, tidy and well-kept. There has been no deterioration in his intelligence quotient; in fact I should not be surprised if at his next examination there is a noticeable rise. His social habits and attitude to his school work have certainly shown marked improvement in the last 12 months.

CASE V.—J.W., a schoolboy, aged nine years, was first examined in consultation by Dr. Lindon on February 13, 1943. The history was rather indefinite. Previously he had been an alert and happy child, but for about a year he had not done as well in his school work as had been expected. For twelve months he had had "dreamy" states, headaches and attacks of unconsciousness. More recently he had had attacks (possibly convulsive seizures) followed by right hemiparesis, headache, vomiting and nominal aphasia, and the right plantar reflex was extensor in type. Up to Christmas, 1942, no papillœdema had been noted.

On examination of the patient, bilateral papillœdema was present. The skull gave a "cracked-pot" sound. After the head had been shaved a bulge was detectable in the left temporal region. X-ray examination gave evidence of a moderate degree of increase in intracranial pressure.

On February 18, 1943, at the Memorial Hospital, Dr. L. C. E. Lindon attempted left ventricular puncture, but was unsuccessful, as the ventricle had collapsed. In the attempt it was noted that the brain needle passed through a very soft area in the left temporo-parieto-occipital region.

Craniotomy was performed three days later. A tumour the size of a billiard ball was found in the left temporo-parieto-occipital region. It had a pseudo-capsule, and about 90% of it was removed. Post-operative convalescence was uneventful.

During April, 1943, the patient completed a course of deep X-ray therapy. On examination in September, 1943, the child's general condition was found to have improved greatly. His speech had become more normal, he had had no headaches and his reading and writing were better. He still had some nominal aphasia, and considerable secondary optic atrophy was present. Improvement continued up to December, 1943. Considerable optic atrophy was still present, but there was no papilloedema and no bulging of the subtemporal decompression incision. Because he had had a few convulsive seizures he was again taking "Dilantin".

About February, 1944, the patient's condition began to deteriorate, and he suffered from incessant vomiting, giddiness and listlessness. He died on April 8, 1944. It was only shortly before his death that bulging of the decompression incision and obvious signs of gross recurrence of his tumour developed. Until a little more than a month before his death the boy had had a reasonably happy existence. Autopsy was not permitted.

Histopathological Examination.

Material and Methods.

The usual fixative employed was 10% formol saline solution. In Cases I, II and III material was limited to frozen or paraffin sections, or both, stained with hæmatoxylin and eosin and hæmatoxylin and Van Gieson. In Cases IV and V, in addition to the foregoing stains, paraffin sections were stained also with Mallory's phosphotungstic acid hæmatoxylin, toluidin blue and mucicarmine. Tissue fixed in formol-ammonium-bromide was available in Case V for staining by metallic impregnation methods (Cajal's gold sublimate method for astrocytes and Penfield's modification of Hortega's silver carbonate method for oligodendroglia).

Description of Tumours.

Case I.—Considerable variation in cellularity was found in the tumour (Figure I). Some areas of the tumour were

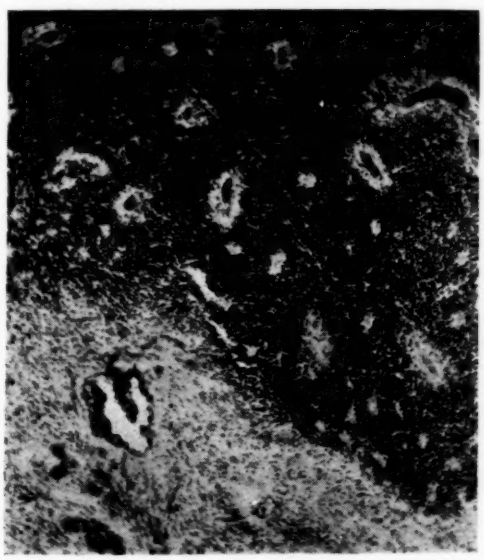

FIGURE I.

Ependymoma (Case I): Cellular type. Variation in cellularity of the tumour. Radial aggregation of the cells around vessels, with a palely staining area between the nuclei of the cells and the vessel walls. Frozen section. (Hæmatoxylin and eosin, × 70.)

indistinguishable from medulloblastoma; in other regions, although the cells were small and packed closely together as in medulloblastoma, there was definite arrangement of cells around vessels, with a palely staining area between the vessel wall and the nuclei of the cells. In places the cells were arranged to form pseudo-rosettes. Other portions of the tumour were fibrous looking and sparsely cellular; they resembled a pilocytic astrocytoma. Areas were found also which bore a superficial resemblance to a neurofibroma; here crossing and interlacement of cells and a tendency to whorling were observed. The nuclei of the tumour cells contained a moderate amount of chromatin in the form of many fine and one or more larger granules. In areas of dense cellularity the nuclei were round or oval in shape and the cytoplasm was sparse and ill-defined. In less cellular portions many of the cells were bipolar, with long tapering processes and elongated or fusiform nuclei. Mitoses were absent. The tumour was moderately vascular. In places extensive endothelial proliferation and budding were noted (Figure II).

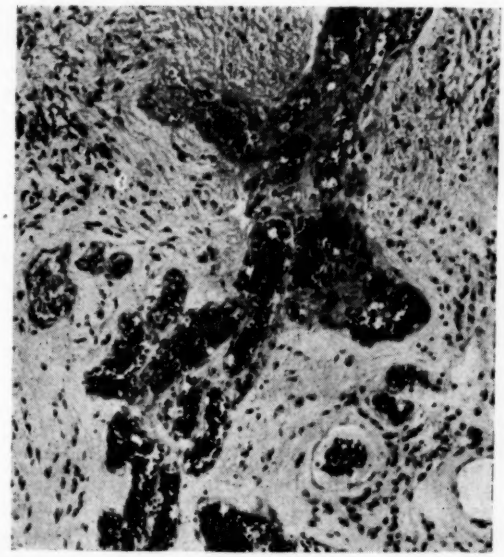

FIGURE II.

Ependymoma (Case I): Endothelial proliferation and budding of vessels. Paraffin section. (Hæmatoxylin and eosin, × 125.)

Case II.—As in Case I microscopic fields of the tumour could be found reminiscent of medulloblastoma. In the major part of the tumour, however, radial aggregation of cells around a central vessel was noted, with a poorly staining zone between the vessel wall and the tumour cells. In a small portion of the tumour minute cysts were present; they were pseudo-cysts rather than true cysts, since they were not lined by epithelium. The tumour contained numerous vessels, many of them of comparatively large size. Extensive endothelial proliferation, however, had reduced their lumina to one or more smaller channels (Figure III). In a few cases the lumen was obliterated entirely. Only a few mitoses were observed.

Case III.—The tumour was permeated by numerous canals lined by a single layer of epithelium (Figure IV). The canals were extremely variable in size; the largest were visible to the naked eye and measured up to two millimetres in cross section and up to five millimetres in length; the lumina of the smallest were just visible under the low power of the microscope; here the cells formed true rosettes. The epithelium of the canals bore a superficial resemblance to normal ependyma, but the cells, instead of being cuboidal, were columnar in shape. The nuclei of the cells were oval or occasionally fusiform, and contained a moderate amount of chromatin. Between the nuclei and the free margins of the cells granules suggestive of blepharoplasts were sometimes seen. No cilia, however, were observed. The tissue lying between the canals was composed of a close-meshed fibrillar network, which did not stain well by routine histological methods and contained only a few cells. In some cases the nuclei of these cells resembled those lining the canals; others, however, were much smaller, denser and pyknotic-looking, and were round, elongated or fusiform in shape.

Mallory's phosphotungstic acid hæmatoxylin stain revealed neuroglial fibres lying in the tissue between the canals, but only in the base of the tumour immediately adjacent to normal nervous tissue. These fibres tended to be most pronounced in the region of blood vessels. The tumour was mildly vascular. In a few instances hyalinized vessels with obliterated lumina were noted which resembled psammoma bodies.

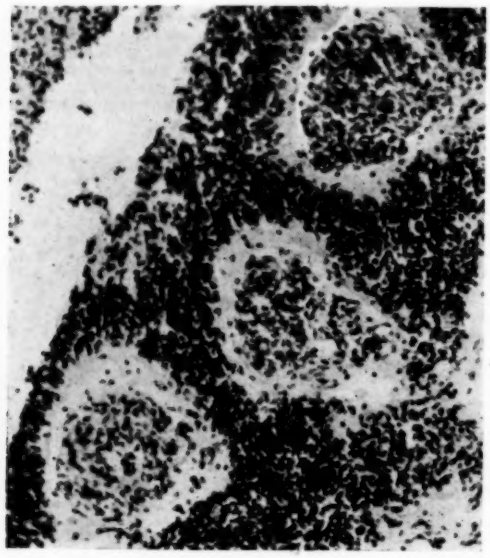

FIGURE III.

Ependymoma (Case II): Reduction of lumina of vessels to a series of smaller channels by extensive endothelial proliferation. Frozen section. (Hæmatoxylin and eosin, × 125.)

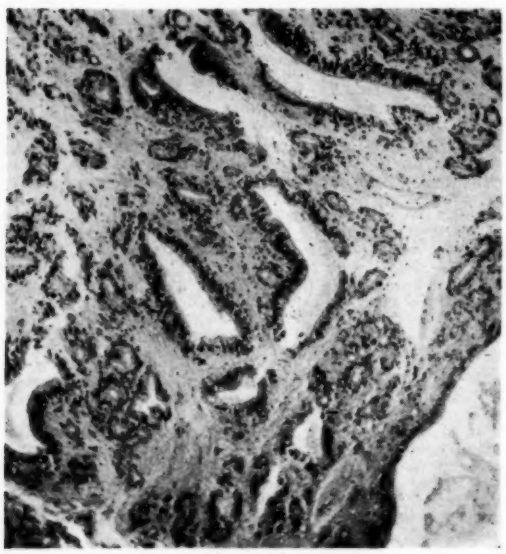

FIGURE IV.

Ependymoma (Case III): Epithelial type, containing numerous canals lined by epithelium. Paraffin section. (Hæmatoxylin and eosin, × 70.)

Case IV.—At first sight the tumour appeared to be a pilocytic astrocytoma, with sparse cells scattered in a fibrous stroma. On more detailed study, however, cells were found arranged around vessels or forming pseudo-rosettes. The degree of vascularity was slight; mild endothelial proliferation was noted. Around a few vessels moderate perivascular infiltration with lymphocytes was present.

Case V.—The tumour was composed of long, spindle-shaped cells with elongated fusiform nuclei containing a moderate amount of chromatin. Some of the cells were arranged in parallel bundles; in others interlacement and crossing or a tendency to whorling were observed. In many places the cells were arranged radially around vessels, a poorly staining area being left between the vessel wall and

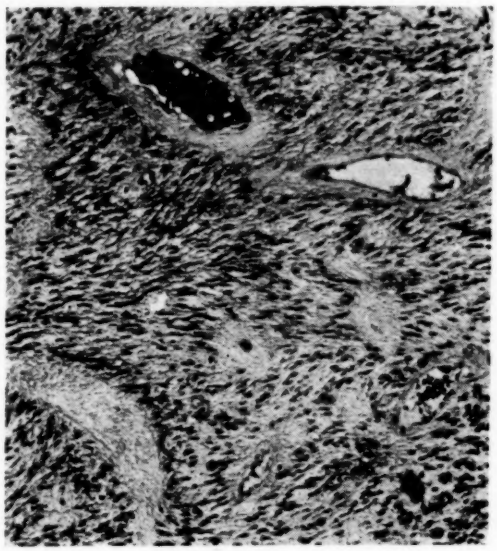

FIGURE V.

Ependymoma (Case V): Cellular type. Palisading of cells, pseudo-rosettes and radial aggregation of cells around vessels. Paraffin section. (Mallory's phosphotungstic acid hæmatoxylin, × 125.)

the cell nuclei. Other cells were palisaded or formed pseudo-rosettes (Figure V). In the vessels at the periphery of the tumour moderate (occasionally intense) endothelial proliferation was present. A few mitoses were observed, mainly in the peripheral part of the tumour.

Discussion.

Sex and Age Incidence.

Three of the patients were males and two females. In Elvidge, Penfield and Cone's[9] series there was a preponderance of females (thirteen females to six males); in Gagel's[9] series the opposite was the case (21 males to nine females).

In the present series the average age on admission to hospital was eleven years; the youngest patient was aged four years and the oldest twenty-four years. Three of the cases occurred in the first decade, one in the second and one in the third. In Bailey and Cushing's[10] series of twelve cases (five were described as of ependymoblastoma) the average age was nineteen years, the youngest patient being aged four years and the oldest forty-one years. In the series described by Elvidge, Penfield and Cone,[9] the average age of six patients with cerebral ependymomata was twenty-nine years, and of five in whom the tumour was situated in the cerebellum the average age was twenty-two years. Gagel[9] maintained that ependymomata were commonest between the ages of twenty and forty years.

Duration of Symptoms before Admission to Hospital.

The duration of symptoms before admission to hospital in Cases I, II, III and IV (tumour situated in or adjacent to the fourth ventricle) varied from 1·5 to 15 months, the average being 5·9 months. In Case V the duration of symptoms was twelve months. In the series of intracranial ependymomata described by Elvidge, Penfield and Cone[9] the pre-operative duration of symptoms varied from a few

days to one year. In a similar series (twelve cases) recorded by Bailey and Cushing[10] the duration of symptoms varied from two to forty-eight months, the average being 13·7 months.

Symptomatology.

In Cases I to IV signs and symptoms were similar to those associated with other tumours of the fourth ventricle such as medulloblastoma (see Swan[7]). They fell naturally into two groups—namely, those indicative of increased intracranial pressure, and those due to interference by the tumour with the functions of the cerebellum and of adjacent structures such as the brain stem. At first there were no localizing signs, and the symptomatology was indicative only of an increase in intracranial pressure (see Craig and Kernohan[11]). Headache, vomiting and papilloedema occurred in all four cases, while drowsiness was present in three (Cases II, III and IV). The symptoms were most apparent on waking in the morning. Confirmatory X-ray evidence of increased intracranial tension in the form of separation of the cranial sutures or of prominence of the gyral impressions was present in three cases (Cases I, III and IV). In Case I Macewen's "cracked-pot" sign was elicited. Bradycardia occurred in Case II.

Papilloedema was mild in Case I, and severe in Cases II, III and IV. In Cases I and IV it was more pronounced in the left eye than in the right. Deterioration of vision was a complaint only in Case III; examination of the visual fields of this patient disclosed left homonymous hemianopsia. In this connexion it should be mentioned that Grant, Webster and Weinberger[12] noted false localizing signs in the form of visual field defects in eight out of 158 verified cases of tumour of the cerebellum.

In the two cases (II and IV) in which lumbar puncture was performed, increase of pressure of cerebro-spinal fluid was present in the latter only. The fluid in this case contained a slightly increased amount of globulin.

With regard to signs and symptoms ascribed to dysfunction of the cerebellum or of adjacent structures, two patients (Cases I and III) showed abnormalities of gait, while another (Case IV) complained of weakness of the legs. In addition, in Case I questionable wasting and hypotonia of the right leg and a tendency to deviation of the left arm were present, and in Case III the swing of the right arm on walking was diminished. In Case II the activity of the left patellar and plantar reflexes was diminished. Nystagmus was present in two cases (Cases I and III). In Case I the occiput was held to the right; in this case bulging of the right suboccipital region was detectable by both physical and X-ray examination; the bulging was probably dependent on the pliability of the skull at this age (four years).

An unusual symptom in Case III was numbness of the left side of the face.

In contrast to Cases I to IV, in Case V localizing symptoms preceded or occurred concomitantly with those due to increase of intracranial pressure. At first the child manifested inability to do his school work. Later "dreamy" states, attacks of unconsciousness and headaches occurred. The localization of the tumour was suggested by the subsequent development of epileptiform seizures followed by a right hemiparesis, nominal aphasia, and an extensor type of plantar reflex on the right side. Although vomiting and headache were present at this period, papilloedema did not occur until late in the clinical picture, when it was associated with the presence of Macewen's sign and positive X-ray findings. Confirmatory evidence of localization of the tumour was given by bulging of the left temporal region noted on physical examination.

Treatment.

All five patients were treated surgically. In Cases II and IV almost complete removal of the tumour was effected, while in Cases I and V partial excision was performed. Second operations were carried out in Cases I and II. In Cases I, II and V, X-ray therapy was later given.

Exploration was carried out in Case III, but the tumour was not located. The mistake was made on account of misinterpretation of the ventriculogram. In ventriculography, unless considerable care is taken, the air may fail to become evenly distributed between the lateral ventricles, and on account of the inequality of pressure, displacement suggestive of tumour in one or other of the cerebral hemispheres may occur.

The post-operative survival period in Case I was three years and nine months, and in Case II four and a half months, and in Case V one year and one and a half months. In Case IV the patient is still alive and free from symptoms five years after operation. The average post-operative survival period was, therefore, not less than two and a half years. (Case III was excluded from these statistics on the grounds that the tumour was not located.)

In Bailey and Cushing's[10] series of twelve cases, the average post-operative survival period was fifteen months, or if three operative fatalities are excluded, twenty months. One patient was alive three years and eight months after operation. Of seven patients treated in Cushing's clinic, Davidoff[13] found that five were still living from seven to nearly fourteen years after operation, one had died after four and a half years and one after less than two years. At least five of these tumours were situated in the cerebral hemispheres. Eisenhardt[14] described a patient suffering from an ependymoma of the fourth ventricle, who was alive and well after thirteen years. The treatment consisted of removal of only a few fragments of growth, followed by deep X-ray therapy.

Site of Tumour.

In three of the cases (I, II and IV) the tumour was located in the fourth ventricle; in one (Case III) it was situated in the cerebellum, and in one (Case V) it was found in the left temporo-parieto-occipital region.

The fourth ventricle is an extremely common site for ependymomata. Of 54 intracranial ependymomata recorded by Kernohan and Fletcher-Kernohan,[6] 32 were located in this ventricle. Gagel[9] described 23 ependymomata of the cranial cavity; seven were situated in the fourth ventricle and one in the cerebellum. Bailey and Cushing[10] reported twelve intracranial ependymomata; eight were located in the fourth ventricle and one in the cerebellar recess. Three out of eight tumours in Fincher and Coon's[15] series were situated in the fourth ventricle. Of 82 tumours of the fourth ventricle described by Craig and Kernohan,[11] 21 were ependymomata.

The frequency of localization of gliomata of the cerebral hemisphere of children in the supramarginal and angular gyri—that is, in the meeting-place of the parietal, occipital and temporal lobes—the so-called *"Dreiländerecke"* was first noted by Tönnis. Of twelve such tumours, Zülch[16] found that seven were ependymomata. It is of interest to note that the tumour in Case V was located in the region just mentioned.

The tendency of ependymomata of the fourth ventricle to send a tongue-like prolongation downwards into the spinal canal has been noted by many investigators, including Bailey,[6] Cushing,[17] Gagel,[9] Pette[18] and Craig and Kernohan.[11] The phenomenon probably depends on the fact that these tumours are for the most part non-infiltrative. In consequence, in their expansion they take the line of least resistance, and pass downwards into the spinal canal. It may be noted that the spinal canal is relatively large in comparison with the spinal cord at this point. Another factor which may play a part is gravity.

Pathology.

Investigation of the tumours revealed a variable degree of differentiation. The best differentiated tumour was in Case III; it conformed to the type described by Kernohan and Fletcher-Kernohan[6] as "epithelial" ependymoma. It is unfortunate that the tumour was not located and removed, since these authors have shown that ependymomata of this type grow very slowly and are more amenable to surgical treatment than the other types.

The remainder of the tumours belonged to the less differentiated, cellular type. The most striking feature was the degree of variation, not only between the individual tumours, but also between different parts of the same tumour. Portions of the tumours simulated such neoplasms as astrocytoma, medulloblastoma and neurofibroma. All four tumours, however, were similar, in that they were characterized by radial aggregations of cells around blood vessels, pseudo-rosettes and sparsity or absence of mitoses.

Endothelial proliferation is considered by Elvidge, Penfield and Cone[5] to be a constant feature of *spongioblastoma multiforme*. These authors and Gough,[19] however, admit that it sometimes occurs in other types of glioma. In a large series of ependymomata examined by Kernohan and Fletcher-Kernohan, nothing atypical was observed in the blood vessels except in the more rapidly growing tumours, in which occasionally endothelial proliferation was present. It is noteworthy that in the present series of cases, four of

the five tumours showed similar proliferation; in two cases it was extensive.

Summary.

The clinical and pathological features of five cases of ependymoma are described.

Three of the patients were males and two females. The average age on admission to hospital was eleven years, and the average duration of symptoms before admission to hospital in the cerebellar cases was 5·9 months. With the exception of one case, in which the tumour was not located at operation, the average post-operative survival period was at least two and a half years.

In four cases the tumour was situated in or adjacent to the fourth ventricle, and in one it was found in the left temporo-parieto-occipital region (the so-called *"Dreiländerecke"* of Tönnis).

Pathologically, one tumour was of the epithelial type and the remainder were of the cellular type. Endothelial proliferation occurred in four of the five cases.

Acknowledgements.

My thanks are due to the chairman of the honorary medical staff of the Royal Adelaide Hospital, Dr. I. B. Jose, to the chairman of the honorary medical staff of the Adelaide Children's Hospital, Dr. H. Gilbert, and to Dr. Leonard Lindon for permission to publish the case records. I am grateful also to Professor J. B. Cleland and to Dr. J. B. Thiersch for post-mortem material, and to Professor E. Weston Hurst for helpful criticism and advice.

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Reviews.

PERSONAL MENTAL HYGIENE.

SINCE one in every twenty of the population enters a mental hospital in the course of his or her lifetime in the role of a certified patient, and an equal number suffer from non-certifiable nervous or mental disorders, any measures calculated to reduce this social and economic wastage demand serious consideration.

"Personal Mental Hygiene" by Dom Thomas Verner Moore is written, with the imprimatur of the Roman Catholic Church, to point out the possibilities of emotional adjustments and to bring into psychiatry the higher things in human life.[1] Although the author's manner is homiletic and his matter tendentious, he gives an admirable survey of a large field of human relationships.

Passing reference is made to such organic factors of mental disorder as syphilis, alcohol and tobacco—to the excessive use of the last-mentioned the author attributes the increasing incidence of cerebral arteriosclerosis. The practice of sobriety and chastity, he holds, would save mankind from these pitfalls. His concern is with the psychological foundations of faults of character and of the essential psychoses, that is to say, of manic-depressive and schizophrenic mental disorders. He considers that the principal fault is lack of emotional control.

The author discusses the nature of emotion in general, and, in particular, depression, anxiety, hatred and anger. He gives special consideration to the causes and management of scrupulosity in adolescents.

Several chapters are devoted to the explanation of unbalanced and psychopathic personalities. Dom Thomas considers that the seeds of stable and unstable personalities are planted in the home and he gives his views of marriage and family life.

Adequate consideration is given to the important question of the roles of the parents in determining the psychological destinies of their children, and the way in which parental over-protection or rejection produces behaviour disorders and psychoneuroses is clearly explained. The author discusses the ideal family life, the interpersonal relationships of parents and children and the management of the difficult period of adolescence. The place of school and religion in the training of children is considered.

In the treatment of delinquency and other behaviour problems, bibliotherapy is advocated, the child being encouraged to read selected books, advantage being taken of the tendency of the reader to identify himself or herself with the hero or heroine of the book to inculcate ideals of life and conduct.

Throughout his book the author illustrates his points with clinical material and with analyses of the lives and works of poets and famous men, and he quotes freely the precepts of Saint Benedict. He advocates the stabilization of character and control of the emotions by the cultivation of attitudes of mind and by religious sublimation. He advisedly states that religion can help only those who have sincere religious convictions. It would not have been out of place to give warning against over-enthusiastic encouragement of religious sublimation, for some of the gravest individual and epidemic manifestations of hysteria have occurred in relation to religious experience.

This book is recommended to clergy and teachers, but its chapters on the home and the family should be read by all who have any responsibilities in the rearing or training of children.

[1] "Personal Mental Hygiene", by Dom Thomas Verner Moore, O.S.B., M.D., Ph.D.; 1944. New York: Grune and Stratton. 8½" × 5½", pp. 337. Price: $4.00.

The Medical Journal of Australia

SATURDAY, JUNE 2, 1945.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

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OVERCROWDING IN AUSTRALIAN UNIVERSITIES.

THE letter by Professor A. N. Burkitt on the overcrowding in the Faculty of Medicine at the University of Sydney, published in the issue of April 28, 1945, should arouse the interest of everyone interested in education. That its publication has not been followed by a larger access of letters to the correspondence columns is perhaps the result of wartime conditions. During the war people have become accustomed to unusual events and have been quite prepared to accept them or have adopted temporary expedients until such time as a return to normal takes place. The overcrowding of Australian universities (for medical faculties are not the only ones to be affected) is not entirely a wartime phenomenon. It is true that manpower requirements and the introduction of regulations to control them were followed by an increase in the number of students desirous of entering certain faculties, but this was only a speeding up of what was really a normal development, for what may be termed the utilitarian faculties were sought by a constantly increasing number of students before this war came upon the world. The recent and laudable decision of the Government to make university education available to any young man or woman in the community desirous of undertaking it and mentally equipped to do so has brought the matter to a head. The Government is not likely to depart from its policy, and no government which succeeded it would, we should imagine, alter provisions that have been so widely approved as those under discussion. The universities therefore provide a problem whose importance for the future of the community cannot be over-estimated. This subject was dealt with in these columns only last October. On that occasion reference to the subject was the result of statements by the assistant professor of zoology and the lecturer in chemistry at the University of Sydney. This time it is the professor of anatomy who protests against the impossible conditions under which he has to conduct his department. Shortly we may expect to hear from the professors of pathology and bacteriology, and, following close upon them, from the professors of obstetrics, medicine and surgery. Professor Burkitt has referred to the principle that the number of students in any one year in the faculty of medicine should not exceed one hundred. In the second and third years of the medical course at the University of Sydney the numbers are already nearly double this. Further, as was stated last October, the accommodation in the dissecting room is suitable for no more than 300, but as many as 550 are crowded into this space. This means that, even when sufficient cadavers are available, students cannot make the dissections on which they should base their knowledge of anatomy. At present cadavers are at a premium and students have to learn their anatomy from dissected parts. Anyone who has studied anatomy will realize how difficult it is to do this and under what a handicap the students are placed. The provision of cadavers for the dissecting room is a subject that calls for a separate discussion, though it is really bound up with that of overcrowding. Since our last reference to this subject it has been reported that in some of the subjects of the first year students are so numerous that lectures have to be repeated to separate groups four and even five times.

Serious overcrowding at a university has an effect on the teacher and also on the taught; in the long run, of course, any untoward effect must act on the community as a whole. If this effect is to be considered, it must be done in the full realization of the place that a university should occupy in the community. A university is a seat of learning; it should lead the intellectual life of a community by the conduct of its affairs as well as by the mental qualities and the intellectual attainments of those who pass through its several faculties. Included in these qualities are a sense of moral values, a willingness to subscribe to them, and a readiness to accept the obligations of citizenship. This does not mean that learning and moral probity are to be claimed only by those who have had a university education. Far from it. What it does mean is that a university is a complete failure if it does not produce citizens who display these qualities. These qualities are something like charity in relation to the other two cardinal virtues, faith and hope. However proficient a university man may be in other respects, if he does not show in his daily life the full fruit of university training he is like "sounding brass or a tinkling cymbal", but somewhat worse because his actions have farther-reaching effects than those of percussion instruments. Truly, "to whom much is given, of him shall much be required". From these remarks some idea may be obtained of that indefinable quality, the spirit of a university. Returning to the teachers and the taught, we must remember that teachers have to teach and they also have to think. To be effective, their teaching must embrace the whole subject and it must be dynamic. Knowledge is not static and no teacher can be master of his subject if he does not renew his store of knowledge by study and by research. There is no more pitiable sight, and none more deplorable from the students' point of view, than a teacher who has become lazy or tired and a backslider. Laziness is reprehensible; tiredness may be forced on an individual. It cannot be avoided by a teacher who essays the impossible with enormous numbers of students in too small an environment, or who has to give the same lecture four or five times right through a university term. Perpetual dis-

couragement is perhaps the most potent cause of bad work. If the staff of a university department spends long periods of time in getting together books and equipment for scientific work and is continually thwarted in reading and research because of the requirements of hordes of students, its members will be superhuman if they retain their enthusiasm and their resilience. It is a teacher's enthusiasm which above all else fires his students to effort and audacity in the pursuit of knowledge. When this is deficient or lacking and when conditions of environment and so on are not what they should be, then the student cannot be expected to be turned out with the equipment usually required of him. So much more is needed in medicine than categorical knowledge of the facts concerned with different diseases, their symptoms and their routine treatment that the present trend in Australian universities must be viewed with alarm. A doctor, in view of the diverse conditions which may affect man and in view of the psychological variations likely to be encountered in his patients, must be more than a technician. That he will be turned out as a technician is one of the dangers of the present situation. The other danger is that he may qualify for inclusion among those who are like "sounding brass or a tinkling cymbal".

Mr. W. Forgan Smith, Chancellor of the University of Queensland, according to newspaper reports, recently used the following words appropriate to our present discussion at the annual conferring of degrees:

> A university must not be divorced from the life of the nation. It must never lose the human outlook. If a university were merely a means of training men in the professions in order that they could practise them, that could be done by a technical college, but a university should provide for a great expansion of the human intellect with beneficial results.

Naturally a remedy will be sought by those who appreciate the evil tendencies of today. Numbers of students are not likely to be materially reduced in the future, if at all. There remains for consideration therefore only an expansion of university departments or an addition to the present number of universities. The former would not be satisfactory; even if staffs were augmented and buildings enlarged, numbers would still be unwieldy. Apart from the question of medical faculties, New South Wales in the opinion of many educationists needs another university. It certainly could find room for a second medical school. A medical school will before long be set up in Western Australia, and a suggestion has been put forward that Geelong would be a suitable situation for a second Victorian university. Be that as it may, the Commonwealth Government in its wisdom has decided that large numbers of Australia's young men and women shall if they wish study medicine; it should therefore find the means for this to be done. Perhaps a University of Canberra will be suggested; for other faculties this might be suitable, but a faculty of medicine must be situated in a populous centre. Professor Burkitt thinks that a university will eventually be established at Newcastle. This would be an admirable place for a medical school. Such a school, if not part of a University of Newcastle, might conceivably be affiliated to a University of Canberra. As soon as the war is over, the whole question of education in Australia should be the subject of inquiry. A commission might be set up to examine the question; in the forefront of such an inquiry should stand the provision of universities and faculties of medicine.

Current Comment.

EXOPHTHALMOS AND GRAVES'S DISEASE.

MANY ancient errors have distorted our views on one of the spectacular signs, or group of signs, found in Graves's disease. This group of signs is that affecting the eyes, and is of peculiar interest as it comes within the ambit of the anatomist, the physiologist, the physician, the surgeon, the ophthalmologist, the pathologist and the biochemist. Nevertheless, recent observations have shown that accuracy even in clinical observation has not been impeccable. A series of articles has been published by several workers attached to the Westminster Hospital School of Medicine and the Department of Clinical research in the University College Hospital Medical School, the clinical work being done by F. F. Rundle and C. W. Wilson, and the laboratory work chiefly by E. E. Pochin.[1] Considerable attention has been devoted of recent years to the pareses of extrinsic eye muscles found in Graves's disease, particularly in those cases in which hyperthyreoidism is not evident or is absent, and also in relationship to other myasthenic manifestations. In fact there seems to be dimly taking shape a composite picture including the facts known about the physiology of muscle, the regulation of body fluids and of fat deposition, the role of the pituitary and thyreoid glands and the hypothalamus, and all the accessory problems of disturbed nutrition involved when the delicate balance is disturbed. No longer can we be content to repeat a platitude about the muscle of Mueller and the sympathetic nervous system.

Great care has been taken in the observations of these workers to measure and assess all factors as far as possible. The degree of ophthalmoplegia when present in the patients studied was measured by a vertometer, and it was found that elevation was the movement most frequently affected, as other observers have also found. Severe affection of the superior rectus muscle is frequent, and occurs more often than paralysis of the horizontally acting muscles, though paralytic squint, due to a symmetry in the power of the opposing muscles, frequently occurs. These observations confirm the constancy of the pattern of the ophthalmoplegia due to Graves's disease and also stress the fact that it is usually bilateral. Three groups of patients were distinguished, those with exophthalmos and eye palsies, those with eye palsies alone and those with lid retraction. Some of these patients showed thyreotoxic signs, before or after operation, but in others the eye signs were spontaneous, and evidence of goitre and hyperthyreoidism was lacking. It is, of course, because of this known fact that there is a tendency now to speak of Graves's disease, and not of thyreotoxicosis or hyperthyreoidism, since these features of the syndrome may be tardy of appearance or even not evident. Retraction of the eyelids has been mentioned above. Even more interesting is the phenomenon of bulging of the eyelids, and this is the subject of one of the group of papers now under review. Rundle and Wilson have fully examined the mechanism and the clinical characteristics. They are quite definite that this bulging is not due to œdema of the palpebral tissues, but to protrusion by orbital fat. It is, of course, evident that increase in the volume of the orbital contents must result in the yielding of the one non-rigid wall of the orbital compartment. Careful clinical observation confirms the view that an increase in orbital fat is the true cause of the protrusion. Further, experiments were carried out on the cadaver in which hot wax was introduced into the orbital tissues, and these proved that the condition found in exophthalmos during life could be exactly imitated. Rundle and Pochin have also done some careful post-mortem work on the orbital tissues, and report that the exophthalmos of Graves's disease is accounted for quantitatively by an increase in the bulk of the retrobulbar tissues. It has been known for some time that the eye muscles showed changes in this condition, and this research confirms the increase in the fat content of these

[1] *Clinical Science*, 1944, Volume V, Numbers 1 and 2.

muscles. In seventeen cases of thyreotoxic disease the average fat content of the eye muscles was doubled, and this change was most evident in the levator muscles, known to be most commonly affected by paresis. Of course, the greatest proportion of increase in bulk of the orbital tissues was due to an increase in the fibro-fatty tissue as distinct from the muscles. Finally, Pochin presents an account of some work on the exophthalmos produced in guinea-pigs by injections of pituitary extracts. He has used a simple method of estimation of the exophthalmos, taking advantage of the lateral projection of the eyes in the guinea-pig, and finds that with adequate controls a direct calliper measurement from cornea to cornea is accurate. The exophthalmos regresses after about a week, and though this period corresponds with the time in which anti-hormones might develop, Pochin reserves judgement on the question of the explanation, pointing out that there may also be varying degrees of resistance in the various orbital tissues. In contrast with the human cases the exophthalmos produced thus in the guinea-pig is due to œdema of the orbital tissues, but, of course, there is a time factor of significance here. Exophthalmos is established experimentally in this animal in forty-eight hours, whereas a moderate protrusion in man may take a year for its development. One interesting point is that thyreoidectomy makes no difference to the production of the exophthalmos. Pochin remarks that it is perhaps advisable to be cautious about accepting as proven the hypothesis of antagonistic action between thyreoid and pituitary hormones as an explanation for some of the phenomena observed in human Graves's disease. It is encouraging that substantial additions to our knowledge of this intricate but fascinating subject are being made just at the time when great advances are also being achieved in treatment.

PSYCHIATRIC DISABILITIES IN THE ARMED FORCES.

MUCH has been written on the subject of psychiatric disabilities in the armed forces during this war. During the last couple of years in particular much more attention has been paid to the importance of recognizing conditions of mental illness in recruits and also such aberrations of personality or mind as might give rise to these states. Colonel S. J. Kopetzky, of the United States Army Medical Corps, has published a critical survey of the validity of the psychiatric criteria adopted in the selection or rejection of recruits for service.[1] He states that almost 4,000,000 men have been rejected for military service for all causes, and that 30% of the rejections were for reasons of mental deficiency or disease. It is evident that cases must arise in which doubt is felt as to a man's suitability for service, and Kopetzky's study has been largely concerned with the fate of those who were accepted with a certain mental hazard recognized or unrecognized. The question is whether these men adjust themselves, and whether there is evidence that the criteria accepted for mental fitness or unfitness are valid.

The figures for New York City have been used for this study, obtained from the psychiatric card index of the Medical Division of the New York City Selective Service Headquarters. This index catalogues the records of 57,800 males of relevant age known to the in-patient departments of the chief psychiatric services of the city and is used to eliminate such persons before they are referred for routine examination. The author points out that the population of the United States is about 17·2 times as great as that of New York City for the relevant age groups, so it is possible to form a fairly accurate idea of the problem in the whole of the services by study of this sample. He states that one out of every sixteen men whose names are registered in the card index will be accepted for military service. The criteria for rejection are the existence of psychosis, psychoneurosis, any of the varieties of psychopathic personality, addiction to alcohol or drugs and primary behaviour disorders. Milder degrees of these last disorders do not always call for rejection. Kopetzky states that of the men accepted for service who have a history of mental illness prior to enlistment, 25% have already been discharged. Clearly, as he states, it is costly to enlist men from this group. This article is highly statistical, but in summarizing the findings it may be said that the criteria adopted by the United States armed forces for acceptance or rejection on the grounds of degrees of mental stability or suitability are valid. The value of records has been shown, and as this author remarks, a complete central file including all persons known to the in-patient and out-patient departments of psychiatric divisions of all hospitals would be of great value, even if it is admitted that many persons might slip through this net. In Australia the position is probably not quite comparable. Here psychiatric services are on a much less extensive scale, and it is likely that many persons fundamentally unsuited for service on mental grounds have never been under the observation of a psychiatrist. It is useful here perhaps to point out how much of the care of persons with mild personality disturbances, neuroses or psychosomatic ailments is in the hands of the general practitioners. Whether so much public insistence on psychiatric disorders is good for the community or not may be argued, but there is no doubt that much of this work can be competently taken in his stride by the educated and understanding practitioner of medicine, and it is to be hoped that the future will see men and women turned out from clinical schools even better equipped for such tasks.

[1] *War Medicine*, December, 1944.

BLOODLESS CIRCUMCISION.

IN a "clinical note" on bloodless circumcision John M. Birnie points out that the hæmorrhage, œdema, swelling and even malformation that sometimes follow the operation for circumcision reflect little credit on the medical profession. While the operation is well tolerated by infants, with adults it may be a formidable procedure. Birnie points out that the skin covering the pendulous portion of the penis is remarkable for its thinness, its looseness of connexion with the deeper parts of the organ and its lack of underlying adipose tissue. The outer and inner layers of the prepuce are composed of the same tissues, and when the foreskin is fully retracted the two layers become continuous without any line of demarcation—the inner layer of the prepuce is often described as mucous membrane, but it is not. In the usual operation of circumcision both layers of the foreskin are incised at the same time and two layers of connective tissue with its vessels are cut. In Birnie's technique this is avoided. In his operation a point is chosen on the outer layer of the prepuce through which an incision is to be made. The skin only is picked up with tooth forceps and a slit is made in it. The blades of a pair of blunt-ended straight scissors are introduced through the slit and opened. By alternately pushing the scissors forward and opening them, the operator can easily separate the skin from the connective tissue without injuring the latter. This procedure is facilitated if the foreskin is fully retracted and kept tense. Should the retraction be prevented by a constriction of the prepuce, the first undermining is done towards the constriction and the constriction is severed from within outwards without any injury to the connective tissue. The flaps of preputial skin to be removed may be of any size or shape desired by the operator. It goes without saying that the end result will depend on the way in which the flaps are planned. Birnie makes no reference to the types of sutures used by him, nor to other details of the operation, but he does lay emphasis on two points. The first is that both skin layers of the prepuce should not be cut at the same time; this is, of course, where his procedure differs from that usually recommended. The second is that the skin of the prepuce should never be cut until it has been separated from the connective tissue by blunt dissection. No connective tissue is removed and there is no reason why hæmorrhage should occur. Birnie's operation is anatomically sound.

[1] *The New England Journal of Medicine*, February 22, 1945.

Abstracts from Medical Literature.

RADIOLOGY.

Myelography with Pantopaque and a New Technique for its Removal.

WENDELL G. SCOTT AND LEONARD T. FURLOW (*Radiology*, September, 1944) state that pantopaque (ethyl idiophenylundecylate) is an entirely satisfactory contrast medium for spinal myelography. It is of about the same opacity and hangs together in one mass almost as well as lipiodol. No reactions have followed its use. Its great advantage lies in the fact that it is much easier to remove from the spinal canal than lipiodol. At the completion of the radiographic examination the patient remains in the prone position and the craniad portion of the column of oil is made to flow beneath the tip of the lumbar puncture needle. The stilette is removed and spinal fluid bubbles out of the needle. No syringe is attached to the needle and no effort is made to aspirate the oil by suction, since when this is done the nerve roots are frequently pulled against the needle and pain is caused and the exit of the oil is also blocked. Instead, the patient is told to take a deep breath and to bear down as if he were attempting to move his bowels. This of course is Valsalva's well-known experiment of forced expiration against a closed glottis and has the effect of increasing the intraspinal pressure. During the Valsalva manœuvre two things happen to the column of opaque oil: first, the whole column tends to move craniad a distance of from 0·5 centimetre to as much as 5·0 to 8·0 centimetres; second, the column becomes narrowed. These changes are the result of an engorgement of the venous plexuses that surround the dura and can be demonstrated by spot films taken before and during forced expiration against the closed glottis. During the period of increased intraspinal pressure the spinal fluid, which is very thin and lacks viscosity, is displaced, the oil being left in more intimate contact with the tip of the needle so that it can be expelled. The oil comes bubbling out of the needle, usually in droplets interspersed with spinal fluid. The Valsalva manœuvre is repeated as often as is necessary until all the oil is removed. As a rule, this is accomplished within twenty minutes, but occasionally it may take as long as forty minutes. At intervals the patient is examined fluoroscopically and the table is adjusted to keep the diminishing oil column beneath the tip of the needle. By this means it has been possible to recover all but a few drops of the oil, without pain to the patient.

Intrathoracic Hodgkin's Disease.

SIDNEY E. WOLPAW, CHARLES S. HIGLEY AND HARRY HAUSER (*American Journal of Roentgenology and Radium Therapy*, October, 1944) state that the intrathoracic manifestations of Hodgkin's disease are of particular interest because of the varied character of the disease in the chest and its close similarity to other commoner lesions of the lungs. Cases may be grouped according to the involvement of the main anatomical structures of the thorax, that is, the mediastinum, thymus gland, lung, pleura, heart and bony cage. It must be recognized that because of the tendency of this disease to be widely disseminated most cases will overlap from one type to another, and the classification is determined by the structure predominantly involved. The mediastinal variety is the most common. The mediastinum contains an extensive collection of lymph nodes. These comprise the small nodes of its anterior and posterior divisions; the more numerous nodes extending along the trachea (the paratracheal nodes), the nodes in the hilum at the angles of the trachea and major bronchi, and in the carina (the tracheo-bronchial nodes); and those at the angles of the larger bronchial branches (the broncho-pulmonary nodes). The manifestations of the disease will depend on the extent and degree to which these various groups of nodes are affected. If the nodes are generally involved, massive, lobulated mediastinal shadows are noted in the radiograph. More frequently, however, discrete enlargement of nodes is present. The hilar nodes are the most commonly involved, the localized enlargement suggesting other lesions such as carcinoma, tuberculosis and sarcoid tumour. The parenchymal type comes next in frequency. These patients are likely to present the most confusing diagnostic problems because of the wide variety of radiological manifestations which can be produced. It is this type which so closely simulates tuberculosis, pneumonia, bronchogenic carcinoma, sarcoidosis, pulmonary abscess and pulmonary metastases. Frequently the pulmonary lesions are produced by direct infiltration of the lung from mediastinal nodes. This invasion occurs as a solid growth which extends across the mediastinal pleura into the parenchyma to produce the picture of a massive tumour of the lung. These cases may be readily confused with bronchogenic carcinoma. A frequent mode of extension is by infiltration of the disease along the peribronchial and perivascular lymphatics and lymphoid tissue, resulting in a granulomatous bronchitis and peribronchitis. A less frequent manifestation is the occurrence of well circumscribed, isolated nodules which closely simulate the radiological appearance of pulmonary metastases. These isolated nodules are usually accompanied by other manifestations of Hodgkin's disease within the thorax, particularly involvement of the mediastinal nodes. Cavitation occurs as a result of necrosis of Hodgkin's tissue within the lung and its extrusion through the tracheo-bronchial tree. This is an uncommon manifestaton of intrathoracic Hodgkin's disease which may be confused particularly with tuberculosis, abscess and cavitary bronchogenic carcinoma. Pleural involvement in Hodgkin's disease is frequent, occurring as nodular or infiltrating masses on the pleural surface. These lesions may produce massive and persistent effusions which can be confused with those of tuberculosis and of carcinoma. The ribs, sternum and other bony structures may be involved by direct extension of the disease from underlying lymph nodes or granulomatous lung or pleura. Occasionally the process may start in the ribs or sternum and invade the lung. The heart is rarely affected in Hodgkin's disease, but may be involved by extension from adjacent structures, particularly the mediastinal lymph nodes.

Congenital Absence of the Lung (Agenesis) and other Anomalies of the Tracheo-Bronchial Tree.

CHARLES F. FERGUSON AND EDWARD B. D. NEUHAUSER (*American Journal of Roentgenology and Radium Therapy*, November, 1944) state that agenesis of the lung is a relatively uncommon congenital anomaly. It occurs more commonly in males than in females, and is noted more often on the left side than on the right. The condition is probably the result of an inherent defect in the germ plasm, as there are often associated congenital anomalies. The symptoms are so inconstant or lacking that X-ray studies *plus* bronchoscopy with lipiodol injection of the tracheo-bronchial tree are the recommended methods for diagnosis. The prognosis should always be guarded, although the condition is compatible with longevity. In cases of persistent emphysema or atelectasis, or cases of supposed unresolved pneumonia, or recurrent pneumonia in the same lobe, congenital anomalies of the tracheo-bronchial tree must be considered.

Periarteritis Nodosa.

A. ELKELES (*British Journal of Radiology*, December, 1944) describes the radiological changes in the lungs in two cases of *periarteritis nodosa*. In one of the cases serial skiagrams were obtained over a period of five months. The radiological features which are considered to be of diagnostic help are: (*a*) lesions which arise from the involvement of the pulmonary vessels, evidenced by enlarged dense hilar shadows, and widespread dense vascular markings, which appear as opaque linear or wavy shadows particularly marked at the bases; (*b*) lesions in the adjacent mesenchymal structure—hilar fibrosis and diffuse mottling, which corresponds to the anatomical distribution of the middle-sized and smaller pulmonary vessels; (*c*) lesions caused by severe arterial damage with consequent involvement of the parenchyma, as evidenced by transitory infiltrations and widespread haziness in the middle and lower zones, but sparse in the periphery.

Osteoporosis Circumscripta Cranii.

FRANK WINDHOLZ (*Radiology*, January, 1945) states that *osteoporosis circumscripta* cannot be regarded as a type or phase of Paget's disease or of any disease entity. It occurs most often in Paget's disease, however, and frequently may be transformed into it. The "primitive" form of *osteoporosis circumscripta*, described in this paper, is a characteristic reaction of the bones of the cranium and is most likely caused by circulatory disturbances in the presence of bony hyperplasias or of bony tumours near the base of the skull.

PHYSICAL THERAPY.

The Problem of Castration in Mammary Cancer.

T. LEUCUTIA (*American Journal of Roentgenology and Radium Therapy*, September, 1944) points out in an

editorial article that a connexion between mammary cancer and sex function was suspected from the earliest days and that it is therefore not surprising that the first attempts at castration should have been made by surgical approach before radiation therapy even existed. Castration by means of X rays and radium, although introduced considerably later, has created an interest which far surpasses the surgical approach. The author reviews the literature on the subject and discusses various animal experiments. The following conclusions are formulated. (i) In the presence of osseous metastases X-ray castration is beneficial in at least one-third of the cases; therefore, its use in association with other established procedures, such as generalized irradiation of the affected areas and so forth, is recommended. (ii) In local recurrences and generalized visceral metastases, X-ray castration is of questionable value, although sporadic favourable results are described in the literature. (iii) In the operable group of mammary cancer radical surgery associated with intensive local and regional irradiation seems to offer the best combination of treatment for the final success. Routine X-ray castration in association with local and regional methods to forestall or retard the appearance of distant metastases is for the time being considered inadvisable. It is conceivable, however, that in those instances in which osseous metastases are already in process of formation, though undemonstrable by physical means, X-ray castration may have a beneficial effect in retarding their actual appearance.

Physiological Effects of Passive and Active Exercise.

E. C. FRIES (*Archives of Physical Therapy*, September, 1944), investigating cardio-vascular response to graded exercise, states that there is almost no experimental evidence as to whether passive movements can produce any change within muscle, or whether such movements have any demonstrable influence on the circulation. By means of a motor-driven bicycle ergometer, by which it was possible to administer passive and active exercise simultaneously to different body parts of the same subject, an attempt was made to appraise the severity of a graded series of passive and active exercises by determining the subject's cardio-vascular response to the work done. The subjects were two women, aged twenty-two and thirty-one years, who had had professional training in physical education and were accustomed to vigorous activity. Neither had engaged in strenuous exercise for some months, nor had they had previous experience with the apparatus. The ergometer exercised the upper and lower extremities simultaneously, together with the large supporting trunk muscles. The author concludes that the circulatory adjustment of the subject to a given exercise on this machine offers an objective method of defining the severity of work done. Rapid, almost violent, leg motion, as incited passively by the machine, exerts little or no effect on the general circulatory mechanism. On this machine exercises can be performed which range from those of mild passive type, involving no circulatory stress, to those of heavy muscular work, causing vascular adjustments paralleling those of anaerobic activity. The author suggests that, in view of the difficulty previously experienced in finding the amount and kind of activity that patients with some cardiac deficiency could tolerate, exercise of this nature should be useful, since it combines the necessary elements of pleasantness, convenience and adaptability. Other patients in need of carefully controlled exercise could be given an activity regimen adapted to their individual work capacity.

E. C. FRIES (*ibidem*), by means of the same machine, has investigated the effects of training on the strength of specific muscle groups. The subjects were eleven normal, healthy young women, ranging in age from twenty to forty-one years; they had either had professional training in physical education or were members of the Women's Army Corps. They performed a bout of combined active and passive exercise on the machine for ten minutes per day for twenty-one consecutive days. Specific muscle groups were tested by means of a modified Martin strength test before and after training. The author concludes that a short period of systematized daily training on the machine used will produce a demonstrable increase in strength in those groups of muscles which are made to develop active tension during exercise. In the present study strong voluntary contractions of the shoulder and abdominal muscles were superimposed on passive motion of the general body musculature. The subsequent augmentation in contractile power resulting from training was found to be limited primarily to those two groups which received active exercise. The subjects were well trained and well coordinated, and the flexors and extensors of the elbow joint were little employed to perform strong arm movements; the work was localized in the relatively more powerful protractors and retractors of the shoulder girdle. The work of the muscles of the legs was seen to be not entirely passive; this applied particularly to those groups which could aid in the maintenance of equilibrium. No significant change in strength as a result of training was observed in the knee flexors, which were subjected to the nearest approach to purely passive activity. The author points out that nothing in this study indicates whether the rapid rise in muscle power due to voluntary exercise was not aided by the fact that the exercise was accompanied by the inciting stimulus of rhythmic and varied passive activity. It is suggested that a physiological relationship may have been present between the incidence of muscle soreness during training and the subsequent increase in muscle strength.

Effect of X-Ray Therapy on the Heart.

T. LEUCUTIA (*American Journal of Roentgenology and Radium Therapy*, March, 1944) in an editorial gives a review of the literature dealing with the action of Röntgen and radium rays on the heart, with special reference to the work of Desjardins, Domagk, and Leach and Sugiura. Desjardins found that all the evidence available pointed to the fact that the specific radiosensitivity of the heart is definitely less in comparison with that of most of the other organs, and that ordinary therapeutic doses of radiation exert no injurious effect on it. Animal experiments indicated that to produce direct degenerative changes of the heart muscle, extremely high doses surpassing many times those of clinical practicability were necessary. In other organs, such as skin, subcutaneous tissue, muscle and bone, late damage can occur when the immediate effect following irradiation was considered to be within normal limits. The question arose whether or not the heart would exhibit a similar behaviour. Leach and Sugiura carried out a series of experiments in rats, subjecting the hearts of these animals to large single doses of radiation up to 20,000*r*. The heart was found to be extremely radio-resistant, the critical dose being 10,000*r*. Below this dose, no demonstrable changes were found microscopically; nor were any late changes seen up to fourteen months after irradiation. These investigators explain this on the fluid flow theory of Failla, and assume that the myocardium can cope with the increased ionic concentration produced by the Röntgen rays up to 7,500*r*, but above that, the intracellular concentration becomes too high to be consistent with the normal metabolism of cell life. In two very recent papers, Leach presented the results of his painstaking clinical observations on the effect of Röntgen rays on the heart of human beings. For this study, 85 patients were chosen, and in order to obtain comparable data they were placed in three groups: (*a*) those with cancer of the head, neck, female genital tract and rectum, in which no radiation therapy was delivered to the thorax; (*b*) those with malignant lymphoma or teratoma, in which irradiation was rather general, always extending to the thorax; and (*c*) those with cancer of the breast, lung, œsophagus and cardiac end of the stomach, in which Röntgen therapy was confined to the thorax alone. The study consisted of a history with special reference to the cardio-vascular system, a physical examination, X-ray examination of the chest and heart, and electrocardiography. The follow-up period ranged from a few months to over three years; and a careful analysis of all cases of all three groups revealed that there was no evidence that Röntgen therapy *per se* caused injury to the heart, or that it was responsible for the complications that arose. Three patients in Group III developed chronic pericarditis or pleuropericardial adhesions, but it is probable that the changes were secondary to the chronic infection of the thoracic wall, ribs and left lung, which were present in all three instances. The most outstanding findings were in connexion with the electrocardiographic examinations. In general, two types of variations from the normal were noted. The first consisted in a minor variation of all the waves, reflecting a change in the physiological state of the myocardium, and the second was a variation in the configuration of the *T* wave. Leach seems quite certain that these electrocardiographic changes cannot be caused by injury to the heart itself. It may safely be concluded that no damage is being done to the heart itself by the various methods currently used in clinical Röntgen therapy.

Medical Societies.

MELBOURNE PÆDIATRIC SOCIETY.

A MEETING of the Melbourne Pædiatric Society was held on October 11, 1944, at the Children's Hospital, Carlton, Melbourne, DR. ALAN MCCUTCHEON, the President, in the chair. Part of this report was published in the issue of May 19, 1945.

Toxic Erythema.

DR. W. W. MCLAREN showed a girl, aged ten years, in the diagnosis of whose condition he asked for help. The child had first been admitted to the hospital on December 2, 1943. The past history was unimportant, and there was nothing relevant in the family history. Five weeks prior to her admission to hospital she developed tonsillitis and a sore on the upper lip, which later disappeared. Two weeks later a small rash appeared under each eye; this spread over the face, scalp and chest. Her appetite was poor and her weight remained stationary.

On examination of the patient, spreading cellulitis of the face and neck was present. The temperature was elevated. A systolic murmur, maximal at the apex, was audible, and the pulmonary second sound was reduplicated. No abnormality was discovered on examination of the lungs or of the abdomen, and no glands were palpable. The child was treated with sulphanilamide, four tablets being given every four hours for two doses and then two tablets every four hours, and zinc cream was applied to the face. On December 3 a petechial rash appeared. Culture of the blood yielded only a growth of contaminants. The cerebro-spinal fluid was free from cells. The dosage of sulphanilamide was reduced to one tablet every four hours. The temperature continued to swing in spite of the sulphanilamide. On December 9 sulphanilamide treatment was discontinued. On December 15 attempted culture from the blood yielded no growth of organisms. On December 16 the girl was very ill; sulphadiazine treatment was begun, two tablets being given every four hours. Microscopic examination of the urine revealed a fair number of granular casts and some red blood cells. Calcium oxalate crystals were present in abundance. The hæmoglobin value was 80%. On December 17 the treatment was changed to sulphathiazole, two tablets being given every four hours. The elevated temperature then began to subside, but it rose from time to time. On December 30 the temperature rose to 106° F. The urine was clear. The child was very ill and pale. The hæmoglobin value was 30% and the leucocytes numbered 2,300 per cubic millimetre. On January 1, 1944, she was given a pint of blood, and forty cubic centimetres of "Pentnucleotide" were given every day for five days. This amount was then reduced to twenty cubic centimetres per day for five days. On January 5 the leucocytes numbered 4,300 per cubic millimetre, and on January 20 they numbered 9,700 per cubic millimetre. The child's condition gradually improved, and she was discharged to her home on January 21.

During the next seven months she remained relatively well, except for some erythema of the face, which was treated in the skin clinic. She was readmitted to hospital on August 7, 1944. Five days before, the condition of her face had become worse. Her gums and palate were swollen and ulcerated and she was drowsy. On examination of the patient, on this occasion the chest and heart were normal. The liver edge was palpable. Erythema with superimposed impetiginous infection was present on the face. Scaly sores were present throughout the scalp. A smear taken from the swollen and inflamed gums showed no evidence of Vincent's angina. She was discharged home on August 9, only to be readmitted to hospital on August 17, as she had not been well since her discharge and the face and mouth were no better. Examination gave the same results as before, but the condition of her face was better. Examination of the blood gave the following information: erythrocytes numbered 3,990,000 per cubic millimetre and leucocytes 5,600 per cubic millimetre, polymorphonuclear cells and lymphocytes being evenly divided and no immature forms being present; the hæmoglobin value was 75%. Examination of a blood film revealed a mild degree of anisocytosis. Her condition improved after the application of gentian violet to the mouth and zinc cream to the face. She was discharged home again on August 23, her mouth being almost healed.

She was readmitted to hospital once more on September 18 with a recurrence of the stomatitis and erythema. She also had tonsillitis and relative leucopenia, the white cells numbering 3,700 per cubic millimetre. On examination, a soft systolic bruit was audible at the apex of the heart. The chest and abdomen were normal. On September 22 the white cells numbered 5,000 per cubic millimetre and a differential leucocyte count gave normal results. Cervical adenitis had developed. On September 25 the face was puffy. The urine contained erythrocytes and granular casts; blood and albumin were present in large amounts. She had a high, swinging temperature up to 105·6° F. and was very ill. On October 5 the leucocytes numbered 8,000 per cubic millimetre. On October 6 "Pentnucleotide" therapy was recommenced, ten cubic centimetres being given per day. On October 8, 1944, she was given sulphamerazine, four tablets immediately, three tablets twice a day after two doses, and then two tablets twice a day. On October 9 the Widal test failed to produce a reaction with *Bacillus typhosus*, *Bacillus paratyphosus* A and B, and to *Brucella abortus*. The blood urea content was nine milligrammes per 100 cubic centimetres. Attempted culture of the fæces yielded no pathogenic organisms. The Mantoux test with a dilution of 1 in 1,000 produced no reaction, and attempted blood culture yielded no growth of organisms. The Wassermann test failed to produce a reaction. The leucocytes numbered 6,800 per cubic millimetre of blood. A second blood transfusion of nineteen ounces was given on October 10, and on October 11, the day of the meeting, the patient felt much better. Dr. McLaren said that the bone marrow was not examined because of the fear of setting up sepsis. No enlargement of the liver or spleen was detected at any stage of her illness.

DR. R. WETTENHALL said that he was interested in the case under discussion because it opened avenues of thought in connexion with two groups of cases. It was of interest to realize that in America prior to 1923 pellagra was a rare disease. After that it became common. However, it was observed that it was the more frequent diagnosis rather than the incidence of the disease that accounted for the increase. Cases of pellagra had previously been labelled *"lupus erythematosus"*. In Australia there had been quite a number of instances of patients approaching pellagra, or "pellagrins", as they had been called. Dr. Wettenhall recalled a typical case in 1924. The patient succumbed, probably because of the difficulty of keeping him on a satisfactory diet. Dr. Julian Smith had mentioned a case of obscure acute illness which he felt was probably fulminating pellagra.

Dr. Wettenhall said that pellagra might appear in the form taken in the case under discussion. *Lupus erythematosus* also might present in the acute form with high fever and a petechial eruption. However, such lesions might settle down, leaving localized round-celled infiltration especially over the nose, fingers and feet. Usually the scalp was involved later, with loss of hair progressing to atrophy. *Lupus erythematosus* did not produce ulceration, though it did produce atrophy. These findings were demonstrated in the case under discussion, in which recrudescences of the acute form had occurred. With regard to treatment, Dr. Wettenhall said that the condition had to be managed as a deficiency disease; in this case the deficiency might be due to lack of absorption. Treatment must be directed to the remedying of this factor. The most successful drugs were quinine, bismuth and gold; in his opinion quinine was to be preferred. It was given orally. Gold was given by injection and he had seen many acute reactions follow its use.

Bowel Resection following Intussusception.

DR. BRUCE HALLOWS showed a male child, aged six years and ten months, who had been admitted to hospital on July 22, 1944, with a history of pain in the right iliac fossa and vomiting of twelve hours' duration. He had been "off colour" during the day. He had suffered from a similar attack two months previously. A week prior to his admission to hospital he had developed a distressing cold, but he had not been very ill. On examination, he appeared pale, but was not distressed. The temperature was 97·8° F. and the pulse rate 88 per minute; the respirations numbered 24 per minute. The teeth were decayed, the tongue was furred and moist and the breathing abdominal; the tonsils were enlarged but not inflamed. The heart and lungs were normal. The abdomen was lax, and fæces were palpable in the descending colon. No abdominal or rectal tenderness was present. The provisional diagnosis was subacute appendicitis or pyelitis. The child was given fluids and a light diet, and observations were recorded on his chart every four hours. Examination of the urine revealed glucose and ketone bodies; microscopic examination revealed a few leucocytes and crystals. At 6.30 a.m. on July 23 he commenced to vomit fæcal material and to complain of severe abdominal pain, and later he appeared to be a little dehydrated. On examination of his abdomen at this time, a firm, sausage-shaped mass could be

felt in the left hypochondrium. He was transferred to the surgical ward with a diagnosis of intussusception. The intravenous administration of saline solution was commenced.

At operation a right paramedian incision was made. When the peritoneum was opened, six ounces of free, straw-coloured fluid were found and an ileo-ileocolic intussusception was present, the apex extending to the splenic flexure. Complete reduction was not attainable. Resection of the large bowel below the hepatic flexure and of the small bowel proximal to the site of disappearance into the caecum when the intussusception was partly reduced was performed. Hæmostasis was secured and an end-to-end anastomosis was performed. The wound was closed in layers, a rubber dam being left to the peritoneal cavity about the site of Morrison's pouch. Post-operative management consisted of the administration of one-twelfth grain of morphine, aspiration of the stomach at intervals of two hours, the use of "Carbogen", and replacement of the saline infusion by serum. The pulse was recorded every hour. The child's condition next day was as good as could be expected. The hæmoglobin value was 80%. A transfusion of fifteen ounces of blood was given along with the intravenous administration of "Dagenan", one gramme at once and 0·5 gramme every four hours. On the following evening the child's temperature had fallen to 97·6° F., but over the next few days it rose to 104° F. He became nauseated and extremely tender over the lower portion of the abdomen. Pelvic peritonitis was diagnosed. He commenced to vomit brownish fluid, but this condition subsided without aspiration of the stomach. The intravenous administration of "Dagenan" was discontinued on August 2, and sulphadiazine and an alkaline mixture were given instead. The abdomen remained tense and tender, and he commenced to suffer from diarrhœa. An X-ray examination of the chest made on August 5 revealed no abnormality. The white blood cells numbered 24,000 per cubic millimetre and the hæmoglobin value was 62%. On August 8 a transfusion of one pint of blood was given, with considerable improvement; on the following day a tender mass could be palpated rectally. The temperature was now swinging between 99° and 103° F. The administration of sulphadiazine was discontinued. The diarrhœa persisted, and on August 16 his elevated temperature commenced to subside. His mental condition had been fairly good, all things considered, and from this date his condition continued to improve. His abdomen became less tense and tender, and on August 18 a further pint of blood was given. On August 23 his elevated temperature had subsided, and although it reached 100° F. on several occasions, and his wound, which had broken down, was not completely healed, he was sent home on August 30. The pelvic abscess had ruptured into the bowel under conservative treatment, while the blood transfusions had improved his constitutional resistance and accelerated his convalescence in a highly satisfactory manner.

Dr. Hallows said that this patient was shown to reveal the pitfalls in the diagnosis of intussusception. The child had been admittted to hospital with a diagnosis of subacute appendicitis. It was worth noticing that an end-to-end anastomosis was performed, although an end-to-end or side-to-side anastomosis was usually carried out in such cases. The intussusception was of the ileo-ileocolic type, and twelve inches of small bowel and more than half of the ascending colon were resected. Dr. Hallows said that he had reviewed the hospital records and found that there had been 324 cases of intussusception from 1931 to 1942, and of these 33, or 10%, had been fatal. In ten cases resection was required, and in only two of these did recovery occur. Prior to 1931 Dr. Hewlitt and Dr. Whitaker had each been interested in a case in which resection was successful; this made a total of only five cases in which operation had been a success. Dr. Hallows said that the ileo-ileal type of intussusception progressed rapidly. He recalled another case with which he was concerned. The child was apyrexial and lacked the classical sign of blood and mucus in the stools. All children with this type of intussusception were apparently between the ages of six and eight years. It was likely that the condition was a separate type of intussusception warranting closer study and research. The recovery of the patient shown was a tribute to the nursing care and to the work of the resident medical officer.

DR. ROBERT SOUTHBY congratulated Dr. Hallows on his success. He said that it was important to observe that intussusception in older children differed clinically from that disease in babies. He, too, could recall a case in which the lesion was regarded as recurrent appendcitis until its true nature was realized. Another point which attracted his attention was the presence of leucocytes and crystals in the urine. He remembered a girl suffering from recurrent colicky pains. With each attack, red blood cells were demonstrable on microscopic examination of the urine, but no calculus was visible in X-ray films. The child proved ultimately to be suffering from intussusception. With regard to the type of anastomosis, it was interesting to note that in the case mentioned by Dr. Hewlitt, an end-to-end anastomosis had been performed.

DR. NORMAN WETTENHALL mentioned another child who had an intussusception high up in the jejunum. The condition was obscure, and the child was admitted to hospital with the diagnosis "abdominal mass for observation" rather than on account of abdominal pain. The resident medical officer in the ward could not palpate a mass. Whilst being kept under observation, the child began to complain of abdominal pain. He was not ill at this time. Some hours later vomiting set in, but still no mass could be palpated. After an enema a normal bowel evacuation occurred, no blood being present in the stools. A few hours later still a tumour was palpated; the vomiting had resulted in dehydration. In other words, this was a case of high intussusception with pain, vomiting and shock, but without the typical sign of blood and mucus in the stools.

DR. H. DOUGLAS STEPHENS said that he remembered a case of small bowel intussusception, in which an interval of twelve hours elapsed before blood appeared in the stools. He removed the tumour, which proved to be a sarcoma. Ten months later the child died from multiple tumours throughout the abdomen.

Dr. Hallows, in reply, said that no mention had been made of a thin barium meal being given for diagnostic purposes. The procedure was harmless and might enable a rapid diagnosis to be made. Periodic examination and hourly fluoroscopic investigation made it possible to demonstrate various forms of complete or incomplete obstruction. This investigation could be used with benefit in all cases of a doubtful abdominal mass, or in which suspicions were aroused that intussusception, volvulus, internal hernia or intestinal tumour was present. Dr. Hallows thanked the speakers for their comments. He said that the real point he wished to make clear was the difficulty in diagnosis. He had been involved in three cases of this nature, and they had all been difficult. In one case, he made a diagnosis of torsion of an ovarian cyst. There was a fairly mobile spherical mass in the left hypochondrium. No blood or mucus was present in the stools. The temperature and pulse rate were normal. He decided to operate on the following morning. He found a complete gangrenous ileo-ileal intussusception, which he resected; but the child died. Pain and shock were not prominent features of this patient's illness, but restlessness was pronounced. In the other case the symptomatology was similar; the child was operated on immediately, but died the next day from a rapidly developed toxæmia.

(To be continued.)

MEDICAL WOMEN'S SOCIETY OF NEW SOUTH WALES.

THE annual meeting of the Medical Women's Society of New South Wales was held in the Lecture Room of the Royal Alexandra Hospital for Children on Monday, March 26, at 8.15 p.m.

Election of Office-Bearers.

The election of office-bearers for the year 1945 was as follows:

President: Dr. Phyllis Anderson.
Vice-Presidents: Dr. MacMahon and Dr. Cuthbert.
Secretary: Dr. M. C. Puckey.
Treasurer: Dr. P. Davey.
Members of the Committee: Dr. Hamilton, Dr. M. Jones, Dr. M. Dalgarno, Dr. J. Storey, Dr. A. Clark, Dr. E. Fiaschi, Dr. Cooley.
Honorary Auditors: Dr. Marjory Little and Dr. Elsie Dalyell.

Meetings.

During the year three general meetings of the society were held. At the first an interesting address was given by Captain Marjory Scott-Young. The second took the form of a clinical meeting, held at the Rachel Forster Hospital for Women and Children, in October, 1944, at which a number of very interesting cases were shown. The third was a buffet dinner at which twenty pre-graduants were guests.

Four committee meetings were held. At the January meeting, a report was received from the Subcommittee on

Housing; it will be forwarded at a later date to the Committee on Housing of the National Health and Medical Research Council.

THE QUEENSLAND MEDICAL WAR BENEFIT FUND.

THE following report on the Queensland Medical War Benefit Fund is published at the request of Dr. J. G. Wagner, Chairman of Trustees.

The trustees of the Queensland Medical War Benefit Fund report as follows on the operation of the scheme for the year ended on April 30, 1945.

1. The trust deed herein provides that:

> The scheme shall continue for at least one year from the date of its coming into operation and shall continue for such further period or periods of one year each as shall be agreed to by each contributor, such agreement being evidenced by the contributor's signature to a consent to such continuation for the year . . . provided that the scheme shall not be continued for any year unless fifty contributors have so consented.

2. The members and donors for the year were as follows: Dr. K. Aaron, Brisbane; Dr. J. G. Avery, Brisbane; Dr. H. D. Ashton, Jandowae; Dr. Felix Arden, Brisbane; Dr. J. A. Arratta, Muttaburra; Dr. Max Berg, Brisbane; Dr. John Bostock, Brisbane; Dr. Hedley Brown, Brisbane; Dr. A. R. K. Burne, Brisbane; Dr. R. N. Burton, Texas; Dr. A. D. Buchanan, Brisbane; Dr. M. W. Carseldine, Brisbane; Dr. R. B. Charlton, Brisbane; Dr. Walter Crosse, Brisbane; Dr. Ernest Culpin, Brisbane; Dr. J. V. Duhig, Brisbane; Dr. G. P. Dixon, Brisbane; Dr. J. F. Dunkley, Brisbane; Dr. P. A. Earnshaw, Brisbane; Dr. L. M. Fraser, Tara; Dr. W. A. Fraser, Boonah; Dr. Milton Geaney, Brisbane; Dr. W. Lockhart Gibson, Brisbane; Dr. P. B. Guastalla, Surat; Dr. L. Halberstater, Townsville; Dr. H. W. Horn, Brisbane; Dr. I. G. Hooper, Brisbane; Dr. J. Wallis Hoare, Brisbane; Dr. Mortimer Hishon, Brisbane; Dr. L. T. Jobbins, Brisbane; Dr. J. K. Joyce, Winton; Dr. John Lahz, Brisbane; Dr. Alan E. Lee, Brisbane; Dr. W. S. Leicester, Gin Gin; Dr. R. Levy, Southport; Dr. Leopold Lofkovits, Brisbane; Dr. F. W. R. Lukin, Brisbane; Dr. C. M. Lilley, Brisbane; Dr. Val McDowall, Brisbane; Dr. S. F. McDonald, Brisbane; Dr. A. D. McKenzie, Toowoomba; Dr. W. A. A. Mackey, Southport; Dr. Alex H. Marks, Brisbane; Dr. E. O. Marks, Brisbane; Dr. F. W. Machin, Clifton; Dr. A. V. Meehan, Brisbane; Dr. G. C. Morrisey, Ingham; Dr. Alex Murphy, Brisbane; Dr. C. C. Minty, Brisbane; Dr. W. H. Nette, Biggenden; Dr. L. J. J. Nye, Brisbane; Dr. S. V. O'Regan, Mundubbera; Dr. J. M. O'Connor, Brisbane; Dr. Alex E. Paterson, Brisbane; Dr. M. S. Patterson, Ipswich; Dr. T. A. Price, Toowoomba; Dr. A. D. D. Pye, Brisbane; Dr. John Power, Brisbane; Dr. T. F. Washington Power, Gympie; Dr. W. H. N. Randall, Dalby; Dr. Christine Rivett, Brisbane; Dr. A. S. Roe, Brisbane; Dr. A. C. Roper, Charleville; Dr. J. Atcheson Spalding, Monto; Dr. J. A. Shanasy, Charleville; Dr. J. E. Streeter, Brisbane; Dr. J. Lloyd Simmons, Brisbane; Dr. J. Muir Smith, Esk; Dr. Clive Sippe, Brisbane; Dr. Neville G. Sutton, Brisbane; Dr. W. H. Steel, Brisbane; Dr. G. C. Taylor, Brisbane; Dr. H. Stanley Waters, Brisbane; Dr. E. R. Watkins, Mount Morgan; Dr. D. I. Wagner, Brisbane; Dr. J. G. Wagner, Brisbane; Dr. L. P. Winterbotham, Brisbane; Dr. H. J. Windsor, Brisbane; Dr. N. V. Youngman, Brisbane.

Deceased Members and Donors.—Dr. R. Graham Brown, Dr. Kenneth Wilson, Dr. A. C. F. Halford.

3. Including the balance taken over from the previous year (£95 14s. 11d.), the total amount received was £2,498 3s. 3d. The benefits paid totalled £2,259, which included the sum of £25 specially given by one member for a particular purpose. The expenses amounted to £84 5s. 11d., and in addition there has been refunded to one member the sum of £4 2s. overpaid by him during the previous year. This makes a total outlay of £2,347 7s. 11d., thus leaving a balance in the bank of £150 15s. 4d.

At the close of the year there was an amount of £17 6s. outstanding for contributions.

The maximum assessment for the year paid by any member was £40 16s., and the largest donation was £50.

At the time of reporting 61 members have agreed to be contributors for a further year, and at a meeting held on April 20 last the retiring trustees were reappointed.

The trustees held nine meetings during the year.

J. G. WAGNER (chairman), J. G. AVERY,
J. V. DUHIG, M. GEANEY, F. LUKIN,
Trustees.

Correspondence.

RUBELLA AND CONGENITAL DEFECTS.

SIR: In reply to the letter of Squadron Leader Fox published in your issue of May 12. The various known ætiological factors were considered in endeavouring to explain and to classify the type of deafness. Time and space prevented an actual statement of all the forms and causes. The possibility of some action through the endocrine glands such as the thyreoid was not lost sight of. In none of these children who are deaf and mute secondary to maternal rubella has there been any evidence of sub-thyreoidism. Although the children are frequently stunted, their appearance is not the least suggestive of cretinism. In the one full post mortem of which I have been able to obtain records the thyreoid gland was examined and was reported upon by the Children's Hospital pathologist as being normal.

Yours, etc.,
D. G. CARRUTHERS.

British Medical Association House,
135, Macquarie Street,
Sydney.
May 16, 1945.

SIR: Dr. Gregg's generous letter which appeared in your issue of May 12, 1945, has entirely resolved the misunderstanding which had arisen between us. When I wrote I merely wished to make clear the fact that the discovery in South Australia of the association between congenital deafmutism and maternal rubella was made quite independently of the similar observations in New South Wales.

Although my colleagues and myself were the first to record this association, I should like to point out that a check of our records, undertaken a few days ago with the object of determining who actually was the first to observe a case, shows that Dr. Tostevin's original case was seen in June, 1942. Dr. Gregg was first aware of the association in December, 1941, so that he was the first to observe a case, although he did not publish his findings at the time.

Yours, etc.,
CHARLES SWAN.

Institute of Medical and Veterinary Science,
Adelaide,
May 22, 1945.

SIR: My attention has been drawn, by the principal of the School for the Deaf and Blind, Mr. S. Holle, to a matter which may be of considerable interest to members of the profession in Queensland.

In admitting mute children to the institution, Mr. Holle was struck by the number of children showing very marked evidence of deafness, and he points out that these children were deaf to speech frequencies and consequently dumb. His figures show that the greatest number of cases of deafness born in any one year since 1930 occurred in 1938, and of these 34 cases gave a history of German measles in the mother during the first two to four months of pregnancy. He further states that the history of thirteen others was incomplete and therefore doubtful. His figures are as follows:

1930	9	1936	4
1931	5	1937	6
1932	3	1938	47
1933	4	1939	5
1934	7	1940	3
1935	7	1941	2
		Total	102[1]

He also draws attention to the fact that in all cases associated with the history of German measles during the mother's pregnancy, there are islands of hearing. In some there are congenital cataracts and in others congenital heart defects.

I understand the Director-General of Health in New South Wales, Dr. Morris, is at present making investigations in reference to the above matter. Some 140 cases of deafness, congenital cataract or heart lesion have occurred in children in New South Wales subsequent to an attack of German

[1] Dr. Felix Arden has forwarded the following dissected monthly totals of the 47 deaf mutes reported by Mr. S. Holle as being born in Queensland in 1938: January, 0; February, 3; March, 18; April, 6; May, 14; June, 2; July, 2; August, 1; September, 0; October, 0; November, 0; December, 1.

measles in the mother during pregnancy. The principal of the Deaf and Blind School has asked for an investigation of some 100 cases of children attending normal schools born in 1938, especially in March, when the largest number of cases of deafness occurred, with a view to ascertaining whether the mothers of these normal children suffered from German measles. The School Health Services Department is prepared to carry out this investigation and to proceed even further than suggested by Mr. Holle. The result of the investigation will be made known to you at a later date.

In the meantime, any suggestions from members of the profession as to investigations in this respect which could be carried out by the School Health Services will be most welcome.

Yours, etc.,

L. ST. VINCENT WELCH,
Chief Medical Officer.

School Health Services,
William Street,
Brisbane.
May 15, 1945.

Medical Prizes.

THE STAWELL PRIZE.

THE Stawell Prize, a memorial to Sir Richard Stawell, is open for competition. The amount of the prize is £30. The conditions are as follows.

1. The prize shall be awarded to the writer of the essay adjudged to be the best on a subject selected annually.
2. The subject for 1945 is "The Clinical and Pathological Features of the Dysenteries".
3. The dissertation should be based on personal observation and experience of the writer.
4. The competition is open to graduates of any Australian university.
5. The trustees reserve the right to withhold the award.
6. Essays must be delivered to the Medical Secretary, British Medical Association (Victorian Branch), by 4 p.m. on November 30, 1945.
7. Each essay must be typewritten or printed and must not exceed 75,000 words in length.
8. Each essay must be distinguished by a motto and must be accompanied by a sealed envelope marked by the same motto, containing the name and address of the author.
9. The trustees reserve the right to publish the prize essay.

National Emergency Measures.

THE NOTIFICATION OF DENGUE FEVER.

MEDICAL PRACTITIONERS have been required to report cases of dengue fever to the Chief Health Officer in each State under the provisions of National Security (Supplementary) Regulation 92, gazetted on February 18, 1943 (see THE MEDICAL JOURNAL OF AUSTRALIA, Volume I, 1943, page 306).

This requirement has now been cancelled with the repeal of this regulation by the National Security (Regulations Revision) Regulations (Number 4), gazetted on April 18, 1945.

The Commonwealth Director-General of Health (Dr. J. H. L. Cumpston), in advising cessation of notification under these regulations, has expressed appreciation of the cooperation of practitioners. The reports received have enabled Chief Health Officers to inform Deputy Directors of Medical Services of the current incidence of dengue amongst the civilian population in localities where troops have been exposed to a risk of infection.

Obituary.

JOHN JOSEPH McMAHON.

WE are indebted to Dr. H. Boyd Graham for the following appreciation of the late Dr. John Joseph McMahon.

His many friends were stupefied to hear of the sudden death of Dr. J. J. McMahon on March 25. He was always so full of energy and so sanguine and jovial and full of life that it is hard to realize that he has gone from our midst.

He was a very highly valued citizen of Kew, where he had conducted a practice for many years. As private practitioner, and in the many public offices he held, he was universally recognized to have great wisdom, enthusiasm and driving force. During the 1914-1918 war he served with distinction, and as lieutenant-colonel commanded a field ambulance. He remained on the active list until 1926, and was associated prominently with training of Australian Army Medical Corps personnel, including young officers. I had the privilege of being his second in command, and we had several sojourns together in the annual militia training camps.

In more recent years I have been associated with him in his war efforts, which included the post of District First Aid Commandant of Kew, the medical charge of the Children's Health Bureau of the Returned Sailors, Soldiers and Airmen's Imperial League of Australia at Anzac House *vice* Colonel A. P. Derham (prisoner of war), and the invaluable work he did as senior medical officer at Rockingham Soldiers' Convalescent Home.

The air-raid precautions activities in Kew were largely inspired by McMahon, who was an exemplary first-aid commandant. The medical arrangements, training and field days in his area were an inspiration to all participants and the envy and admiration of all other municipal authorities.

He was beloved by his patients and was the friend of the children with whom he came into contact. He will long be remembered as a community-minded doctor, and no one can assess too highly the value and importance of his life and deeds.

His successor in the practice is his son, Captain J. G. McMahon, who has been recalled from service abroad for the purpose, and also to father his younger brother and sister. The young family deserves our sympathy and the good wishes and help of their late father's colleagues and friends.

DR. J. NEWMAN MORRIS writes: The death of J. J. McMahon is mourned by his many medical friends and by his large circle of patients. But no group will grieve for him and miss him more deeply than the members of the fighting services of this war who have passed through Rockingham Red Cross Convalescent Home in Kew, Victoria.

In the early years of the war, before medical establishments had become fully established, provision for the institutional care of psychiatric military patients was inadequate, and the Australian Red Cross Society offered its assistance to the Director-General of Medical Services and placed Rockingham at his disposal to accommodate sixty patients, subsequently increased to 100.

Colonel McMahon was appointed medical officer, and at the time of his death he had developed Rockingham into a model establishment for the mental adjustment of the patients. He was given a free hand by the Red Cross Society, and even without any special psychiatric training his method of handling the men produced most successful results. He was full of practical sympathy, displayed with common-sense firmness. He knew each patient individually and applied appropriate methods of rehabilitation to each case, and gave full play to his kindly optimism.

The encouraging stimulus he applied produced almost universal response and cooperation from these men who had broken down under the stress of combat conditions or the unusual experiences of military life. Many of the boys had lacked any effective supervision in their early years, and the unusual experience that any man was really interested in their individual welfare was novel to them. Practically each one of the men on his discharge was fit to occupy a useful position in civil life. So great was the effect of the atmosphere at Rockingham under Dr. McMahon's leadership, that the discharged men formed a Rockingham Old Boys' Association of which he was the patron.

This fine work carried out so quietly and effectively in the readjustment of men's lives is, in the opinion of the writer, one of the outstanding contributions in Australia in remedying some of the human wastage of the war, and it is due almost solely to the fine qualities and character of Colonel McMahon. He was cut off in the midst of it and will be most difficult to replace. Although he was in other spheres extremely busy, he never neglected the work which was near to his heart and which he really enjoyed. He literally worked himself to death. The Australian Red Cross Society and the staff and patients at Rockingham are amongst the most sincere mourners, and in expressing their great debt to him offer the most sincere sympathy to his relatives.

ROBERT BERTIN RICHARD VALLACK.

We regret to announce the death of Dr. Robert Bertin Richard Vallack, which occurred on May 27, 1945, at North Sydney.

THOMAS CHERRY.

We regret to announce the death of Dr. Thomas Cherry, which occurred on May 27, 1945, at Glen Iris, Victoria.

Naval, Military and Air Force.

APPOINTMENTS.

The undermentioned appointments, changes *et cetera* have been promulgated in the *Commonwealth of Australia Gazette*, Numbers 94 and 97, of May 11 and 17, 1945.

Naval Forces of the Commonwealth.

Permanent Naval Forces of the Commonwealth (Sea-Going Forces).

Promotions.—Temporary Surgeon Lieutenants (D) Alan Victor Ward and John Ellis Newton are promoted to the rank of Acting Temporary Surgeon Lieutenant-Commander (D), dated 31st March, 1945.

Citizen Naval Forces of the Commonwealth.

Royal Australian Naval Reserve.

Promotion.—Surgeon Lieutenant Allan Gordon Campbell, D.S.O., is promoted to the rank of Surgeon Lieutenant-Commander, dated 1st April, 1945.

Royal Australian Air Force.

Citizen Air Force: Medical Branch.

The following Temporary Flight Lieutenants are granted the acting rank of Squadron Leader whilst occupying Squadron Leader posts with effect from the dates indicated: N. Morrissy (254850), 1st February, 1945, E. A. M. Ryan (255908), 16th March, 1945.

The grant of the acting rank of Squadron Leader to Temporary Flight Lieutenant F. J. Kenny (254851) is terminated upon his ceasing to occupy a Squadron Leader post with effect from 14th March, 1945.

Flying Officer F. J. Rogers (142450) is granted the acting rank of Flight Lieutenant whilst occupying a Flight Lieutenant post with effect from 1st March, 1945.

DECORATIONS.

Surgeon Lieutenant Michael Dean Dawson, H.M.A.S. *Australia*, has been mentioned in dispatches, "for great devotion to duty and fortitude in the care of wounded".

CASUALTIES.

According to the casualty list received on May 21, 1945, Captain N. H. Rose, Sydney, New South Wales, who had been previously reported prisoner of war, is now reported "recovered".

According to the casualty list received on May 28, 1945, Lieutenant-Colonel A. H. Powell, A.A.M.C., Armidale, New South Wales, and Lieutenant-Colonel T. U. Ley, A.A.M.C., Armadale, Victoria, have been removed from the "seriously ill" list.

Nominations and Elections.

The undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

Burkitt, Arthur Robert, Provisional Registration, 1944 (Univ. Sydney), 108, Albert Road, Homebush, New South Wales.

Fogarty, Dairmuid, M.B., B.S., 1941 (Univ. Sydney), 137, George Street, Bathurst, New South Wales.

Cassidy, Desmond John, M.B., B.S., 1944 (Univ. Sydney), 112, Lang Road, Centennial Park, New South Wales.

The undermentioned have applied for election as members of the Tasmanian Branch of the British Medical Association:

Katchor, George, M.B., B.S., 1945 (Univ. Melbourne), General Hospital, Launceston, Tasmania.

Christophers, Barry Eastwood, M.B., B.S., 1945 (Univ. Melbourne), General Hospital, Launceston, Tasmania.

Pinkus, Numan, M.B., B.S., 1944 (Univ. Melbourne), General Hospital, Launceston, Tasmania.

Diary for the Month.

June 5.—New South Wales Branch, B.M.A.: Organization and Science Committee.
June 6.—Victorian Branch, B.M.A.: Branch Meeting.
June 6.—Western Australian Branch, B.M.A.: Council Meeting.
June 7.—South Australian Branch, B.M.A.: Council Meeting.
June 7.—New South Wales Branch, B.M.A.: Special Groups Committee.

Medical Appointments: Important Notice.

Medical practitioners are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All Public Health Department appointments.

Editorial Notices.

Manuscripts forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to The Medical Journal of Australia alone, unless the contrary be stated.

All communications should be addressed to the Editor, The Medical Journal of Australia, The Printing House, Seamer Street, Glebe, New South Wales. (Telephones: MW 2651-2.)

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